IBM

*e*server

xSeries 236
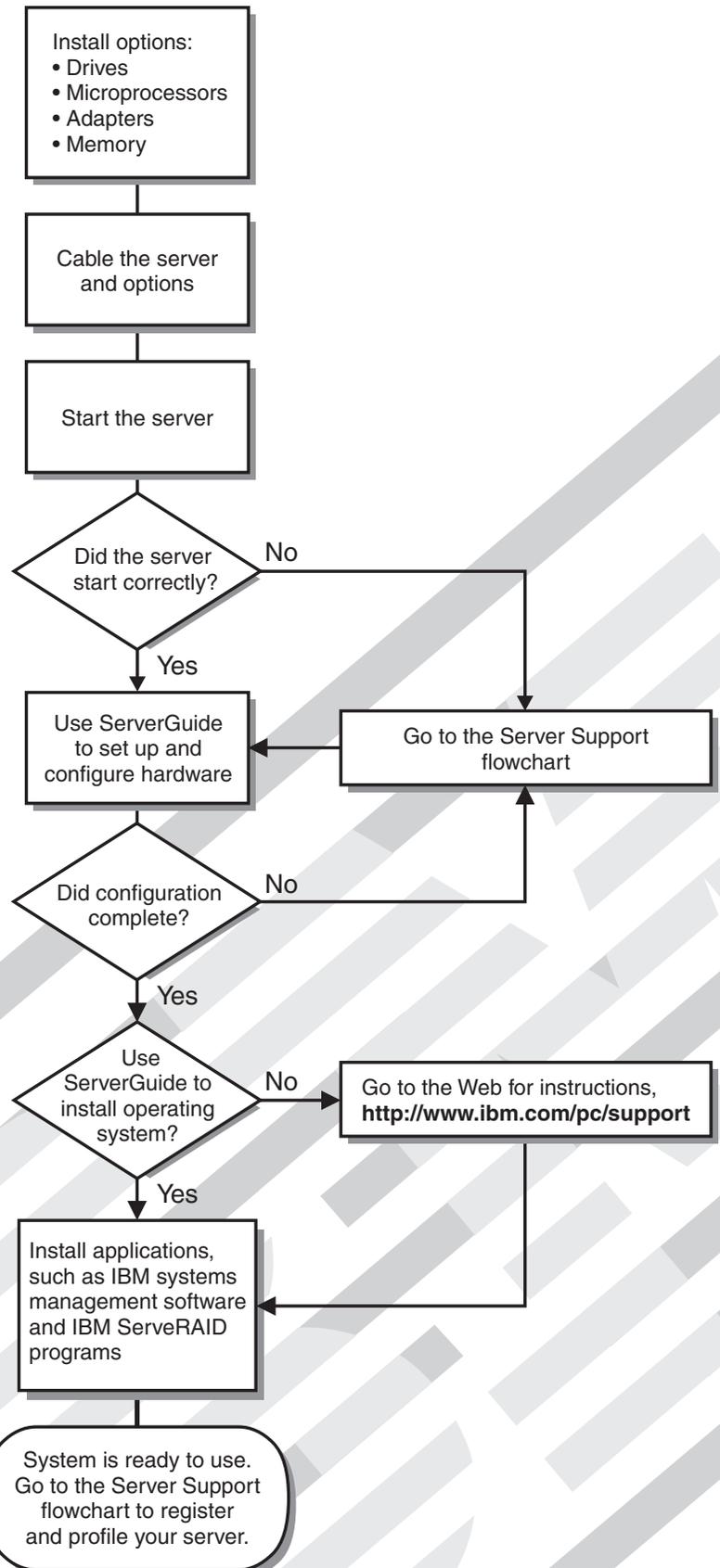### Type 8841

Installation Guide

Welcome. . .

Thank you for buying an IBM xSeries server. Your server is based on the X-Architecture technology, and it features superior performance, availability, and scalability.
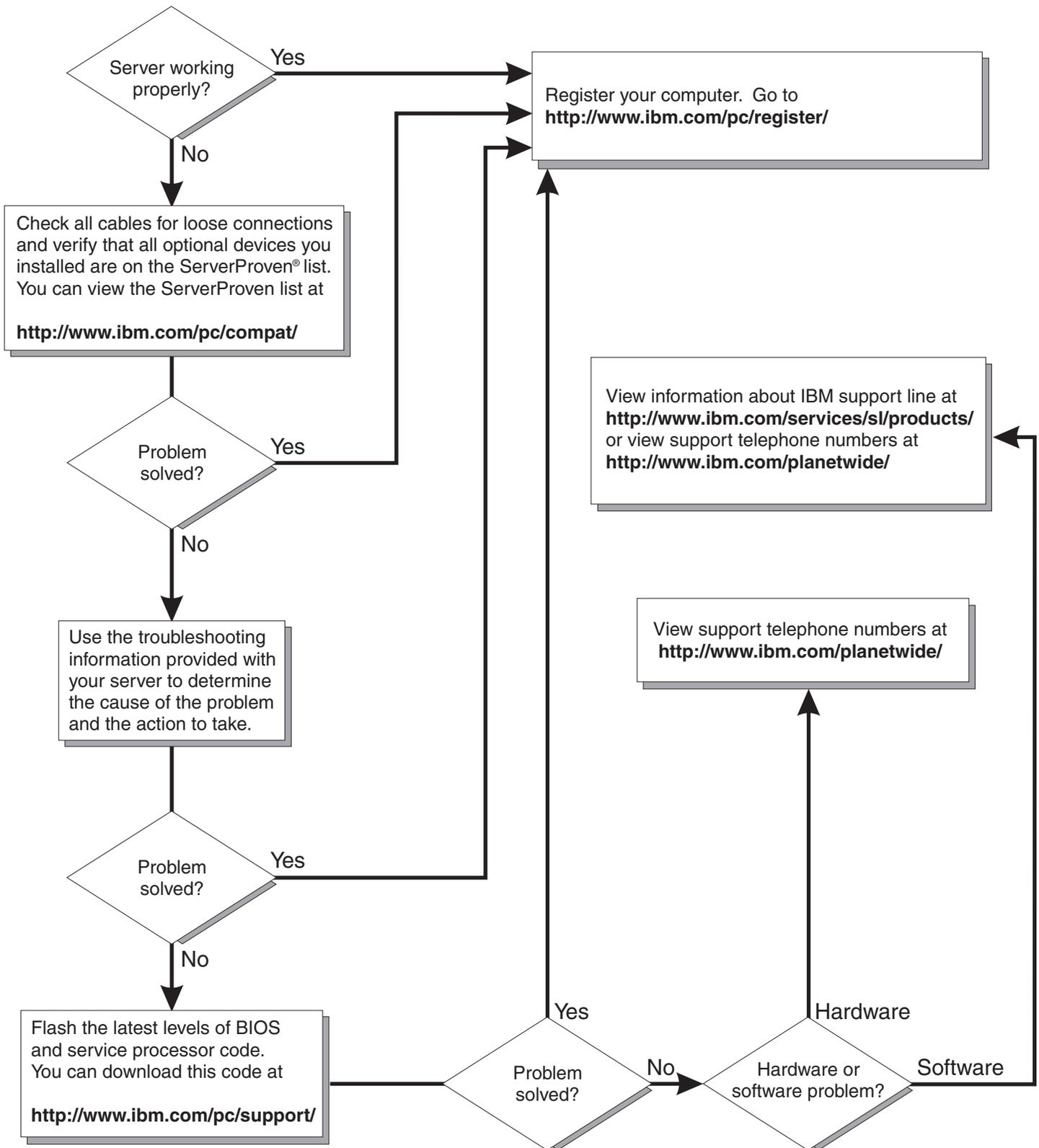
This server *Installation Guide* contains information for setting up and configuring your server.

For detailed information about your server, view the publications on the Documentation CD.

You can also find the most current information about your server on the IBM Web site at: http://www.ibm.com/pc/support

---

Install options:
• Drives
• Microprocessors
• Adapters
• Memory

↓

Cable the server and options

↓

Start the server

↓

Did the server start correctly? → **No** → Go to the Server Support flowchart

↓ **Yes**

Use ServerGuide to set up and configure hardware ← Go to the Server Support flowchart

↓

Did configuration complete? → **No** → (to Go to the Server Support flowchart)

↓ **Yes**

Use ServerGuide to install operating system? → **No** → Go to the Web for instructions, **http://www.ibm.com/pc/support**

↓ **Yes**

Install applications, such as IBM systems management software and IBM ServeRAID programs

↓

System is ready to use. Go to the Server Support flowchart to register and profile your server.

Server Support

Server working properly? — **Yes** → Register your computer. Go to **http://www.ibm.com/pc/register/**

No

↓

Check all cables for loose connections and verify that all optional devices you installed are on the ServerProven® list. You can view the ServerProven list at

http://www.ibm.com/pc/compat/

↓

Problem solved? — **Yes** → Register your computer. Go to **http://www.ibm.com/pc/register/**

No

↓

Use the troubleshooting information provided with your server to determine the cause of the problem and the action to take.

↓

Problem solved? — **Yes** → Register your computer. Go to **http://www.ibm.com/pc/register/**

No

↓

Flash the latest levels of BIOS and service processor code. You can download this code at

http://www.ibm.com/pc/support/

→ Problem solved?

Yes ↑ → Register your computer. Go to **http://www.ibm.com/pc/register/**

No → Hardware or software problem?

Hardware ↑ → View support telephone numbers at **http://www.ibm.com/planetwide/**

Software → View information about IBM support line at **http://www.ibm.com/services/sl/products/** or view support telephone numbers at **http://www.ibm.com/planetwide/**

IBM xSeries 236 Type 8841

Installation Guide

Note:

Before using this information and the product it supports, read the general information in Appendix B, "IBM Statement of Limited Warranty Z125-4753-08 04/2004," on page 57, and Appendix C, "Notices," on page 75.

Second Edition (March 2005)

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前，请仔细阅读 Safety Information
（安全信息)。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας
(safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się
z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

Important:

All caution and danger statements in this documentation begin with a number. This number is used to cross reference an English caution or danger statement with translated versions of the caution or danger statement in the *IBM Safety Information* book.

For example, if a caution statement begins with a number 1, translations for that caution statement appear in the *IBM Safety Information* book under statement 1.

Be sure to read all caution and danger statements in this documentation before performing the instructions. Read any additional safety information that comes with the server or optional device before you install the device.

Statement 1:

DANGER

> **Electrical current from power, telephone, and communication cables is hazardous.**
>
> **To avoid a shock hazard:**
> - **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
> - **Connect all power cords to a properly wired and grounded electrical outlet.**
> - **Connect to properly wired outlets any equipment that will be attached to this product.**
> - **When possible, use one hand only to connect or disconnect signal cables.**
> - **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
> - **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
> - **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

To Connect:	To Disconnect:
1. Turn everything OFF.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.
5. Turn device ON.	

Statement 2:

CAUTION:
When replacing the lithium battery, use only IBM Part Number 33F8354 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:
- **Throw or immerse into water**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

Dispose of the battery as required by local ordinances or regulations.

Statement 3:

CAUTION:
When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:
- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
- **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

DANGER

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

Statement 4:
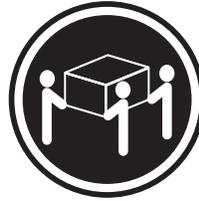
≥ 18 kg (39.7 lb)   ≥ 32 kg (70.5 lb)   ≥ 55 kg (121.2 lb)
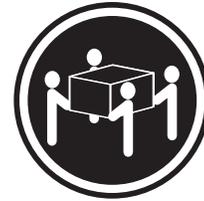
CAUTION:
Use safe practices when lifting.

Statement 5:

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

2

1
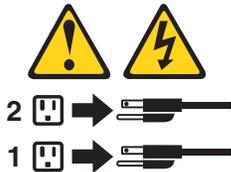
Statement 8:

CAUTION:
**Never remove the cover on a power supply or any part that has the following
label attached.**

**Hazardous voltage, current, and energy levels are present inside any
component that has this label attached. There are no serviceable parts inside
these components. If you suspect a problem with one of these parts, contact
a service technician.**

Chapter 1. Introduction

This *Installation Guide* contains instructions for setting up your IBM® @server™ xSeries® 236 Type 8841 server and basic instructions for installing some options. More detailed instructions for installing options are in the *Option Installation Guide* on the IBM *xSeries Documentation* CD, which comes with the server. This document contains information about:

- Setting up and cabling the server
- Starting and configuring the server
- Installing some options
- Solving problems

The server might have features that are not described in the documentation that you received with the server. The documentation might be updated occasionally to include information about those features, or technical updates might be available to provide additional information that is not included in the server documentation. These updates are available from the IBM Web site. Complete the following steps to check for updated documentation and technical updates:

1. Go to http://www.ibm.com/pc/support/.
2. In the **Learn** section, click **Online publications**.
3. On the ″Online publications″ page, in the **Brand** field, select **Servers**.
4. In the **Family** field, select **xSeries 236**.
5. Click **Continue**.

The server comes with an IBM *ServerGuide™ Setup and Installation* CD to help you configure the hardware, install device drivers, and install the operating system.

The server comes with a limited warranty. You can obtain up-to-date information about the server and other IBM server products at http://www.ibm.com/eserver/xseries/.

Record information about the server in the following table. You will need this information when you register the server with IBM.

Product name	IBM @server xSeries 236 server
Machine type	8841
Model number	_____
Serial number	_____
Key serial number	_____
Key manufacturer	_____
Key phone number	_____

The model number and serial number are on labels on the bottom of the server and on the front, visible through the bezel, as shown in the following illustration.

Model type/serial
number
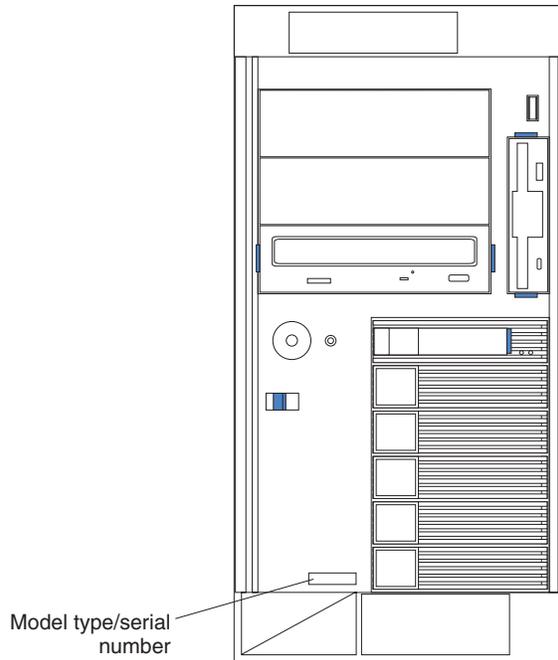
Important: The server keys cannot be duplicated by a locksmith. If you lose them, order replacement keys from the key manufacturer. The key serial number and the telephone number of the manufacturer are on a tag that is attached to the keys.

If you plan to install the server in a rack, you must purchase a Tower-to-Rack Kit. For a list of supported options for the server, see the ServerProven® list at http://www.ibm.com/pc/compat/.

The IBM xSeries Documentation CD

The IBM *xSeries Documentation* CD contains documentation for the server in Portable Document Format (PDF) and includes the IBM Documentation Browser to help you find information quickly.

Hardware and software requirements

The IBM *xSeries Documentation* CD requires the following minimum hardware and software:

- Microsoft® Windows NT® 4.0 (with Service Pack 3 or later),Windows® 2000, or Red Hat Linux.

    Note: Microsoft NT is not supported on the xSeries 236.

- 100 MHz microprocessor.
- 32 MB of RAM.
- Adobe Acrobat Reader 3.0 (or later) or xpdf, which comes with Linux operating systems. Acrobat Reader software is included on the CD, and you can install it when you run the Documentation Browser.

Using the Documentation Browser

Use the Documentation Browser to browse the contents of the CD, read brief descriptions of the documents, and view documents using Adobe Acrobat Reader or xpdf. The Documentation Browser automatically detects the regional settings in use in your system and displays the documents in the language for that region (if available). If a document is not available in the language for that region, the English version is displayed.

Use one of the following procedures to start the Documentation Browser:

- If Autostart is enabled, insert the CD into your CD-ROM drive. The Documentation Browser starts automatically.
- If Autostart is disabled or is not enabled for all users, use one of the following procedures:
    - If you are using a Windows operating system, insert the CD into the CD-ROM drive and click **Start --> Run**. In the **Open** field, type

        `e:\win32.bat`

        where *e* is the drive letter of the CD-ROM drive, and click **OK**.
    - If you are using Red Hat Linux, insert the CD into the CD-ROM drive; then, run the following command from the /mnt/cdrom directory:

        `sh runlinux.sh`

Select the server from the **Product** menu. The **Available Topics** list displays all the documents for the server. Some documents might be in folders. A plus sign (+) indicates each folder or document that has additional documents under it. Click the plus sign to display the additional documents.

When you select a document, a description of the document appears under **Topic Description**. To select more than one document, press and hold the Ctrl key while you select the documents. Click **View Book** to view the selected document or documents in Acrobat Reader or xpdf. If you selected more than one document, all the selected documents are opened in Acrobat Reader or xpdf.

To search all the documents, type a word or word string in the **Search** field and click **Search**. The documents in which the word or word string appears are listed in order of the most occurrences. Click a document to view it, and press Crtl+F to use the Acrobat search function or Alt+F to use the xpdf search function within the document.

Click **Help** for detailed information about using the Documentation Browser.

Notices and statements used in this document

The caution and danger statements that appear in this document are also in the multilingual *Safety Information* document, which is on the IBM *xSeries Documentation* CD. Each statement is numbered for reference to the corresponding statement in the *Safety Information* document.

The following notices and statements are used in this document:

- **Notes:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate potential damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage could occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

Features and specifications

The following information is a summary of the features and specifications of the server. Depending on the server model, some features might not be available, or some specifications might not apply.

Table 1. Features and specifications

Microprocessor:	Predictive Failure Analysis® (PFA) alerts:	Acoustical noise emissions:

Microprocessor:
- Intel® Xeon™, 2.8 GHz or higher depending on server model
- 1 MB Level-2 cache
- 800 MHz front-side bus (FSB)
- Support for up to two microprocessors

  Note: Use the Configuration/Setup Utility program to determine the type and speed of the microprocessor.

Memory:
- Standard: 512 MB or 1 GB, depending on server model, expandable to 16 GB
- Type: 400 MHz, registered, ECC, PC2-3200 double data rate II, SDRAM
- Sizes: 256 MB, 512 MB, 1 GB, or 2 GB (when available) in pairs
- Connectors: two-way interleaved, eight dual inline memory module (DIMM) connectors
- Maximum: Four pairs of single-stacked PC2-3200 DDRII DIMMs

Drives standard:
- Diskette: 1.44 MB
- CD-ROM: IDE

Expansion bays:
- Six open hot-swap, slim-high, 3.5-inch drive bays
- Three 5.25-inch bays (CD-ROM drive installed in one bay)
- One 3.5-inch removable-media drive bay (diskette drive installed)

PCI expansion slots:
- One Active PCI-X™ (hot-plug) 133 MHz/64-bit
- Two PCI-X non-hot-plug 100 MHz/64-bit
- Two PCI Express x4 non-hot-plug
- One PCI non-hot-plug 33 MHz/32-bit

Upgradeable microcode:
BIOS, diagnostics, and IBM Baseboard Management Controller upgrades (when available) can update EEPROMs on the system board

Predictive Failure Analysis® (PFA) alerts:
- Power supplies
- Fans
- Memory
- Hard disk drives
- Microprocessors
- Voltage regulator modules (VRMs)

Integrated functions:
- Baseboard management controller
  - Service processor with light path diagnostics
  - RS-485 (ASM interconnect)
  - RJ-45 (Ethernet 10/100 ASM interconnect)
  - Support for IBM Remote Supervisor Adapter II SlimLine
- Dual Broadcom 5721 10/100/1000 Ethernet controllers (dual stacked RJ-45 connectors)
- Two serial connectors
- One parallel connector
- Support for one external and one optional external or internal Ultra320 SCSI connector (dual-channel SCSI controller with RAID capabilities)
- Three Universal Serial Bus (USB) v2.0 connectors (one on the front and two on the rear of the enclosure)
- Keyboard connector
- Mouse connector
- ATI Radeon RV7000-M video
  - Compatible with SVGA
  - 16 MB video memory

  Note: The baseboard management controller is also known as the service processor.

Security features:
- Door lock
- Power-on and administrator passwords
- Remote-control security settings
- Selectable drive startup
- Keyboard password
- System-management security
  - User login password
  - Read-only or read/write access
  - Dial-in call-back

Power supplies:
- Standard: One 670 watts (115-230 V ac)
- Upgradeable to two hot-swap power supplies

Acoustical noise emissions:
- Without redundant fans installed
  - Sound power, idle: 5.8 bel
  - Sound power, operating: 5.8 bel
  - Bystander sound pressure, idle: 43 dBa
  - Bystander sound pressure, operating: 43 dBa
- With optional redundant fans installed
  - Sound power, idle: 6.1 bel
  - Sound power, operating: 6.1 bel
  - Bystander sound pressure, idle: 46 dBa
  - Bystander sound pressure, operating: 46 dBa

Electrical input:
- Sine-wave input (50-60 Hz) required
- Input voltage range automatically selected
- Input voltage low range:
  - Minimum: 100 V ac
  - Maximum: 127 V ac
- Input voltage high range:
  - Minimum: 200 V ac
  - Maximum: 240 V ac
- Input kilovolt-amperes (kVA) approximately:
  - Minimum: 0.1 kVA
  - Maximum: 0.8 kVA

Heat output:
Approximate heat output in British thermal units (Btu) per hour
- Minimum configuration: 341 Btu (100 watts/hour)
- Maximum configuration: 2600 Btu (760 watts/hour)

Environment:
- Air temperature:
  - Server on: 10° to 35°C (50° to 95°F) Altitude: 0 to 2134 m (7000 ft)
  - Server off: -40° to +60°C (-40° to 140°F) Maximum altitude: 2133 m (7000 ft)
- Humidity:
  - Server on: 8% to 80%
  - Server off: 8% to 80%

Size:
- Height: 440 mm (17.3 in.)
- Depth: 700 mm (27.5 in.)
- Width: 221 mm (8.7 in.)
- Weight: 33.5 kg (74 lb) to 45.8 kg (101 lb) depending upon configuration

Major components of the xSeries 236 Type 8841 server

Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.

Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.

The following illustration shows the major components in the server.

Note: The illustrations in this document might differ slightly from your hardware.
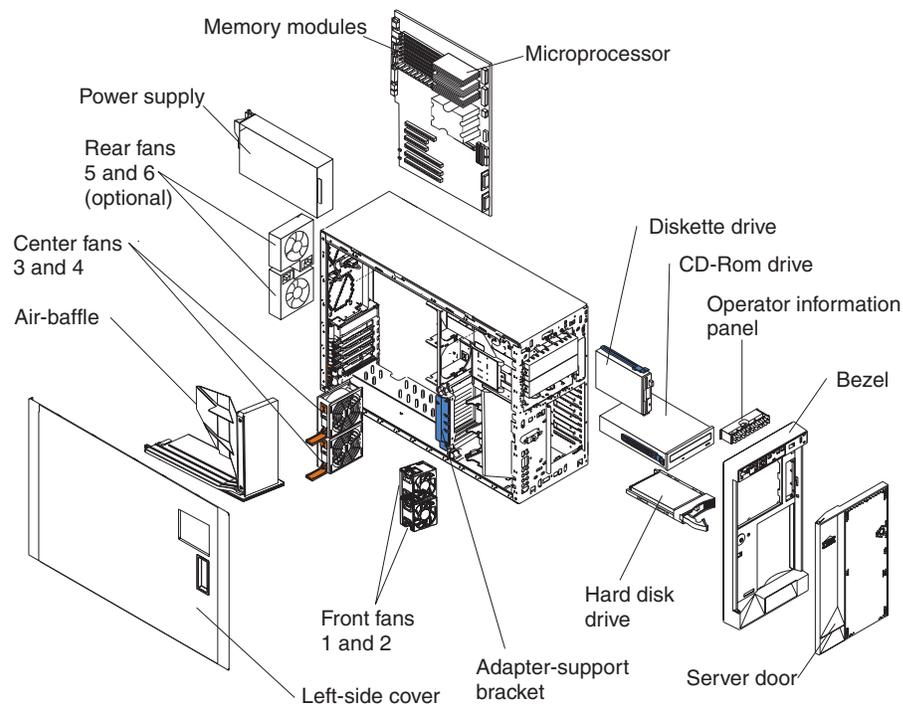
Chapter 2. Installing options

This chapter provides basic instructions for installing hardware options in the server. These instructions are intended for users who are experienced with setting up IBM server hardware. If you need more detailed instructions, see the *Option Installation Guide* on the IBM *xSeries Documentation* CD.

Installation guidelines

Before you begin installing options, read the following information:

- Read the safety information beginning on page vii, and the guidelines in "Handling static-sensitive devices" on page 8. This information will help you work safely with the server and options.
- Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and other devices.
- Back up all important data before you make changes to disk drives.
- Have a small flat-blade screwdriver available.
- You do not have to turn off the server to install or replace hot-swap power supplies, hot-swap hard disk drives, hot-swap fans, or hot-plug Universal Serial Bus (USB) devices.
- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.
- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- When you need to access the inside of the server, you might find it easier to lay the server on its side.
- For a list of supported options for the server, go to http://www.ibm.com/pc/compat/.

System reliability guidelines

To help ensure proper cooling and system reliability, make sure that:

- Each of the drive bays has a drive or a filler panel and electromagnetic compatibility (EMC) shield installed in it.
- If the server has redundant power, each of the power-supply bays has a power supply installed in it.
- There is adequate space around the server to allow the server cooling system to work properly. Leave approximately 50 mm (2.0 in.) of open space around the front and rear of the server. Do not place objects in front of the fans. For proper cooling and airflow, replace the left-side cover before turning on the server. Operating the server for extended periods of time (more than 30 minutes) with the left-side cover removed might damage server components.
- You have followed the cabling instructions that come with optional adapters.
- You have replaced a failed fan within 48 hours.
- You have replaced a hot-swap drive within 2 minutes of removal.

- You do not remove the air baffle while the server is running. Operating the server without the air baffle might cause the microprocessor to overheat.
- Microprocessor socket 2 always contains either a microprocessor baffle or a microprocessor and heat sink.

Working inside the server with the power on

The server supports hot-swap devices and is designed to operate safely while it is turned on and the cover is removed. Follow these guidelines when you work inside a server that is turned on:

- Avoid wearing loose-fitting clothing on your forearms. Button long-sleeved shirts before working inside the server; do not wear cuff links while you are working inside the server.
- Do not allow your necktie or scarf to hang inside the server.
- Remove jewelry, such as bracelets, necklaces, rings, and loose-fitting wrist watches.
- Remove items from your shirt pocket, such as pens and pencils, that could fall into the server as you lean over it.
- Avoid dropping any metallic objects, such as paper clips, hairpins, and screws, into the server.

Handling static-sensitive devices

Attention: Static electricity can damage the server and other electronic devices. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

To reduce the possibility of damage from electrostatic discharge, observe the following precautions:

- Limit your movement. Movement can cause static electricity to build up around you.
- Wear an electrostatic-discharge wrist strap, if one is available.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Do not leave the device where others can handle and damage it.
- While the device is still in its static-protective package, touch it to an unpainted metal part of the server for at least 2 seconds. This drains static electricity from the package and from your body.
- Remove the device from its package and install it directly into the server without setting down the device. If it is necessary to set down the device, put it back into its static-protective package. Do not place the device on the server cover or on a metal surface.
- Take additional care when handling devices during cold weather. Heating reduces indoor humidity and increases static electricity.

Removing the server door

The following illustration shows how to remove the door from the server.
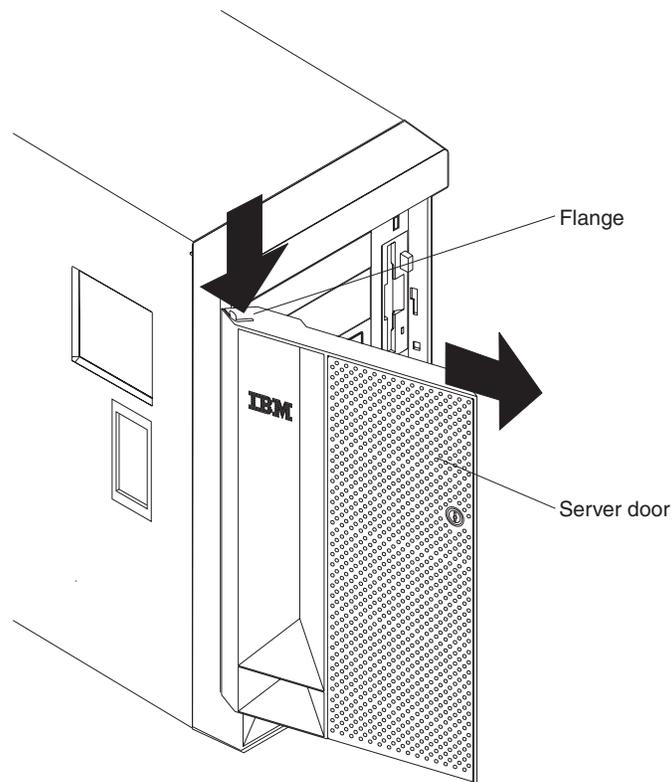
Complete the following steps to remove the server door:

1. Read the safety information beginning on page vii, and "Installation guidelines" on page 7.
2. Unlock and open the server door.
3. Locate the flange on the top edge of the door.
4. Press the flange downward while pressing outward on the door; then, lift the door up and off the hinge. Set the door aside in a safe place.

Removing the server side cover and bezel

Before you remove the side cover and bezel, read the safety information beginning on page vii, and the guidelines in "Handling static-sensitive devices" on page 8.

Removing the side cover

The following illustration shows how to remove the side cover from the server.

Note: If you have not already removed the door, remove it as described in "Removing the server door" on page 9.

Left-side cover

Cover-
release
latch
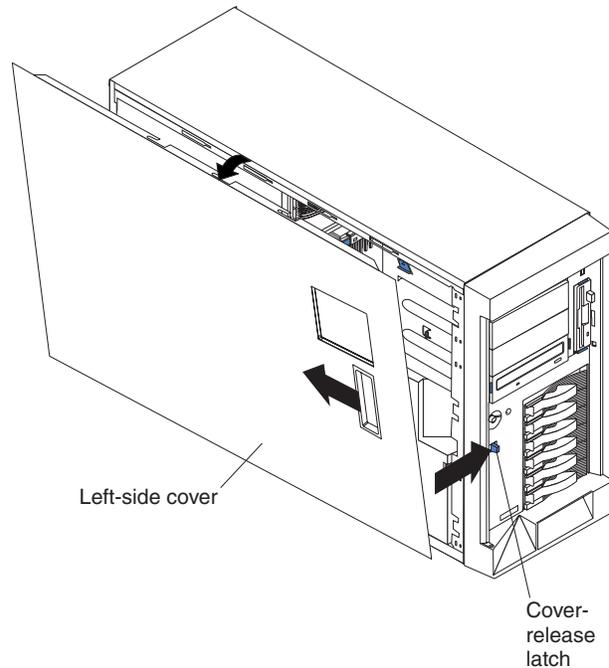
Complete the following steps to remove the server left-side cover:

1. Push the plastic cover-release latch near the edge of the side cover to the right to release the cover.

2. While pushing the plastic cover-release latch, slide the side cover slightly toward the rear of the server; the cover will stop after approximately 25 mm (1 inch). Lift the cover off the server and set the cover aside.

   Attention: For proper cooling and airflow, replace the cover before turning on the server. Operating the server for extended periods of time (more than 30 minutes) with the cover removed might damage server components.

Removing the bezel

The following illustration shows how to remove the bezel from the server.

Bezel-release lever
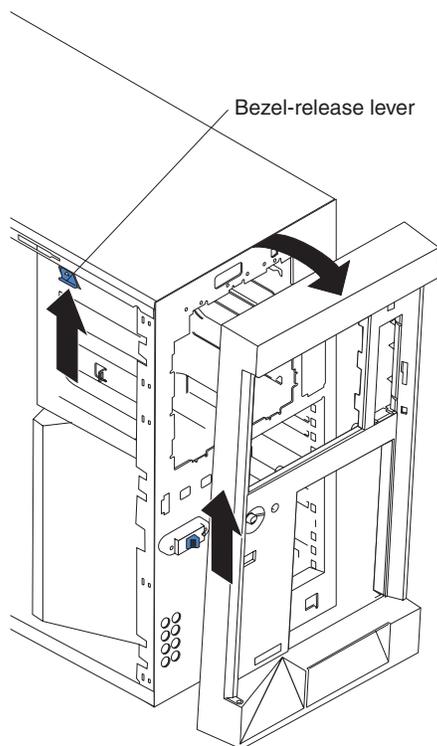
Complete the following steps to remove the bezel:

1. Remove the left-side cover and locate the bezel-release lever.
2. Press up on the bezel-release lever.
3. Pull the top of the bezel away from the chassis; then, lift the bezel to disengage the bottom tabs.
4. Remove the bezel from the server and store the bezel in a safe place.

Installing a memory module

The following notes describe the types of dual inline memory modules (DIMMs) that the server supports and other information that you must consider when installing DIMMs:

- The server supports 400 MHz, 1.8 V, 240-pin, PC2-3200 single-stacked double-data-rate (DDR) II, registered synchronous dynamic random-access memory (SDRAM) with error correcting code (ECC) DIMMs. These DIMMs must be compatible with the latest PC3200 SDRAM Registered DIMM specification. For a list of supported options for the server, go to http://www.ibm.com/us/compat/.

- When you install additional DIMMs, be sure to install them in pairs. The DIMMs in each pair must be the same size, and type. You can mix compatible DIMMs from various manufacturers.

- The second pair does not have to contain DIMMs of the same size, speed, type, and technology as the first pair.

- The server supports Chipkill™ memory if the DIMMs are all type x4. Installing a non-Chipkill memory DIMM or DIMM pair in the server, disables Chipkill memory.

- You do not have to save new configuration information when installing or removing DIMMs. The only exception is if you replace a faulty DIMM that was marked as **Disabled** in the **Memory Settings** menu. In this case, you must re-enable that memory row in the Configuration/Setup Utility program or reload the default memory settings. See the *User's Guide* on the IBM *xSeries Documentation* CD for more information.
- When you restart the server after adding or removing a DIMM, the server displays a message that the memory configuration has changed.
- See the *Option Installation Guide* on the IBM *xSeries Documentation* CD for more information about memory mirroring and the on-line spare feature.

The following illustration shows how to install DIMMs on the system board.
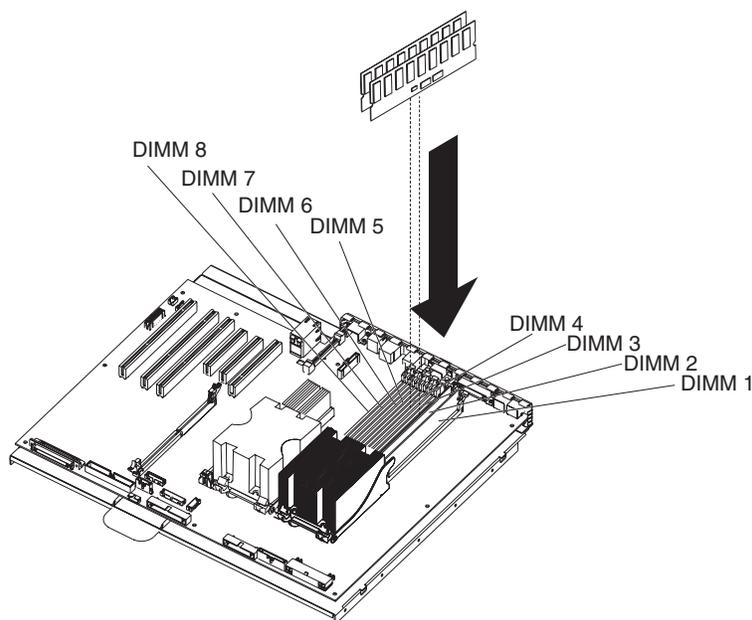
Install the DIMMs in the order shown in the following table.

Table 2. DIMM installation sequence

Pair	DIMM connectors
First	1 and 2
Second	3 and 4
Third	5 and 6
Fourth	7 and 8

Installing a hot-swap hard disk drive

The following notes describe the types of hard disk drives that the server supports and other information that you must consider when installing a hard disk drive:

- The server supports up to six 1-inch (26 mm) slim-high, 3.5-inch, hot-swap hard disk drives in the standard hot-swap bays.
- The hot-swap bays are arranged vertically in the standard hard disk drive cage; the bay numbers are 0 through 5 (from bottom to top).
- For a list of supported options for the server, go to http://www.ibm.com/us/compat/.
- Inspect the drive tray for signs of damage.

- Make sure that the drive is correctly installed in the tray.
- If the server has an optional RAID adapter, see the documentation that comes with the adapter for instructions for installing a hard disk drive.
- All hot-swap drives in the server should have the same throughput speed rating; mixing speed ratings might cause all drives to operate at the lower throughput speed.
- To minimize the possibility of damage to the hard disk drives when you are installing them in a rack configuration, install the server in the rack before installing the hard disk drives.
- You do not have to turn off the server to install hot-swap drives in the hot-swap drive bays. However, you must turn off the server when performing any steps that involve installing or removing cables.
- You can install three additional hot-swap hard disk drives in the server after you install the 3-Pack Ultra320 Hot-Swap Expansion Kit. These drives are in the optional hard disk drive cage. Connect the cable to J58 SCSI channel A on the system board. See the instructions that come with this option for information.
- Some filler panels come with a slim filler.
- The SCSI ID for each hot-swap hard disk drive is printed on the bezel.

The following illustration shows how to install a hot-swap hard disk drive.
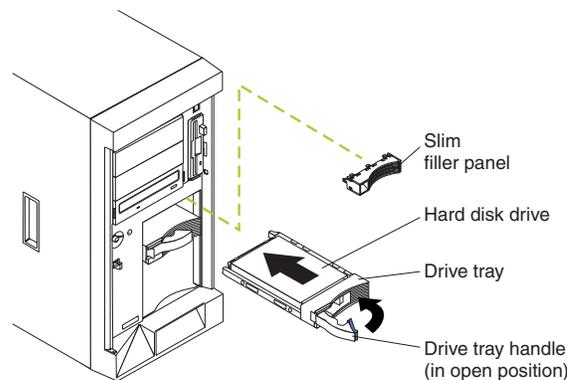
Complete the following steps to install a hot-swap hard disk drive:
1. Read the safety information beginning on page vii, and "Installation guidelines" on page 7.
2. Remove the filler panel from one of the empty hot-swap bays.
3. Make sure that the tray handle is open; then, install the hard disk drive into the hot-swap bay.

Notes:
1. When you turn on the server, check the hard disk drive status LEDs to verify that the hard disk drive is operating properly.

   If the amber hard disk drive status LED for a drive is lit continuously, that drive is faulty and must be replaced. If the green hard disk drive activity LED is flashing, the drive is being accessed.
2. If the server will be configured for RAID operation using the integrated SCSI controller with RAID capabilities or an optional ServeRAID™ controller, you must configure the disk arrays before installing the operating system. See the ServeRAID documentation on the *IBM ServeRAID Support* CD for additional information about RAID operation and complete instructions for using ServeRAID Manager.

Installing an additional microprocessor

The following notes describe the type of microprocessor that the server supports and other information that you must consider when installing a microprocessor:

- For a list of supported options for the server, go to http://www.ibm.com/us/compat/.
- See the *Option Installation Guide* on the IBM *xSeries Documentation* CD for details on how to install a microprocessor.
- The server supports Intel Xeon 2.8 GHz or higher microprocessors in each socket. If you are installing two microprocessors, they must be the same cache size and type, and the same clock speed.
- Read the documentation that comes with the microprocessor to determine whether you must update the basic input/output system (BIOS) code in the server. To download the most current level of BIOS code for the server, go to http://www.ibm.com/pc/support/.
- Obtain an SMP-capable operating system. For a list of supported operating systems, go to http://www.ibm.com/pc/us/compat/.
- You can use the Configuration/Setup Utility program to determine the specific type of microprocessor in the server.

Complete the following steps to install a microprocessor:

1. Read the safety information beginning on page vii, and "Installation guidelines" on page 7.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Lay the server on its side; then, remove the cover and air-baffle assembly.

   Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details about handling these devices, see "Handling static-sensitive devices" on page 8.
4. Remove the microprocessor baffle and the protective film from the second microprocessor socket.

Heatsink 2

Microprocessor 2

Microprocessor release lever

Microprocessor 2 VRM

Microprocessor baffle
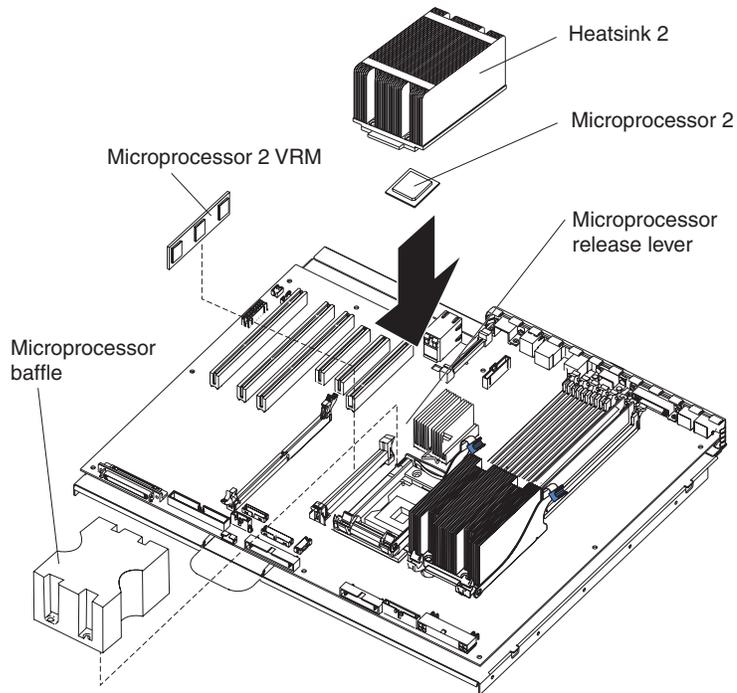
5. Install the VRM.

6. Install the microprocessor:

   a. Touch the static-protective package containing the new microprocessor to any unpainted metal surface on the server; then, remove the microprocessor from the package.

   b. Rotate the locking lever on the microprocessor socket from its closed and locked position until it stops or clicks in the fully open position (approximately 135° angle).

Lever closed

Lever fully open
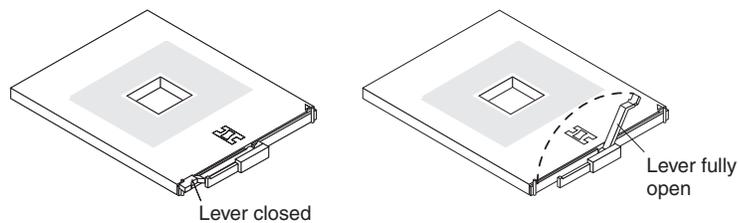
   c. Position the microprocessor over the microprocessor socket as shown in the following illustration. Carefully press the microprocessor into the socket.

Attention: To avoid bending the pins on the microprocessor, do not use excessive force when pressing it into the socket.
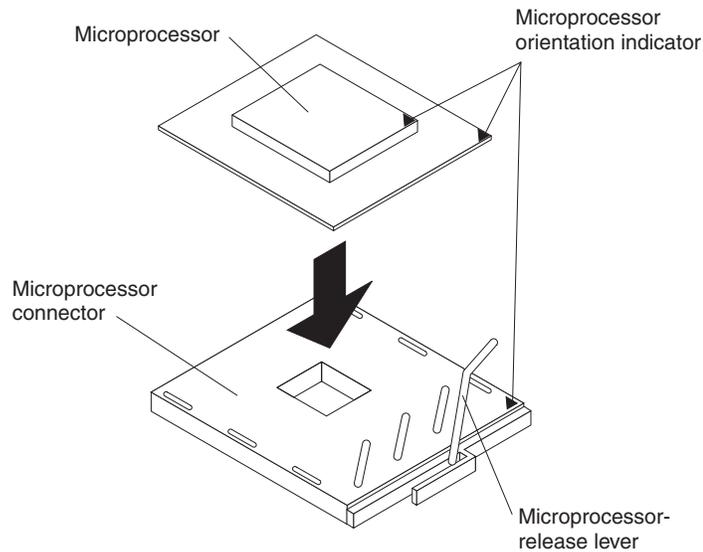
d. Close the microprocessor release lever to secure the microprocessor.
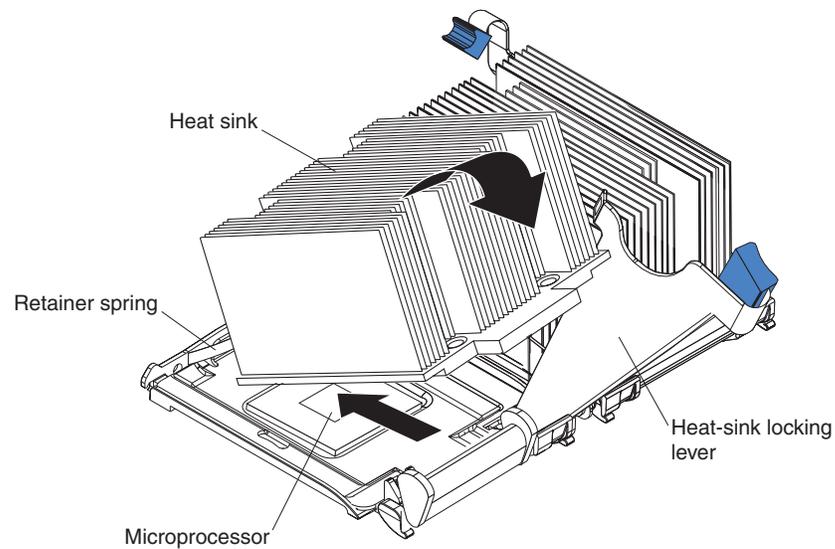
7. Open the heat-sink release lever and install a heat sink on the microprocessor; then, close the release lever.

8. If you have other options to install or remove, do so now.

9. Replace the air-baffle assembly and cover. Go to "Completing the installation" on page 22.

Installing an adapter

The following notes describe the types of adapters that the server supports and other information that you must consider when installing an adapter:

- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this section. If you must change the switch or jumper settings on the adapter, follow the instructions that come with the adapter.

- Avoid touching the components and gold-edge connectors on the adapter.
- You can install full-length adapters and non-hot-plug adapters in slots 4 and 5.
- The hot-plug slot (slot 6) supports full and half-length hot-plug and non-hot-plug adapters. The hot-plug feature is operating system dependant. See the documentation that comes with your operating system to see if it supports this feature.
- The 32-bit PCI slot (slot 1) supports 5.0 V and 3.3V PCI adapters, with the exception that you cannot install a long adapter in slot 1 on servers with a ServeRAID-7k adapter installed.
- The 64-bit PCI-X slots 4 through 6 support 3.3 V signaling PCI or PCI-X adapters; they do not support 5.0 V signaling adapters.
- The PCI bus configuration is as follows:
  - Non-hot-plug, 33 MHz 32-bit PCI slot 1 is on PCI bus A.
  - Non-hot-plug, 64-bit PCI Express x4 slot 2 is on PCI bus B (independent of slots 1, 3, 4, 5, and 6).
  - Non-hot-plug, 64-bit PCI Express x4 slot 3 is on PCI bus C (independent of slots 1, 2, 4, 5, and 6).
  - Non-hot-plug, 100 MHz 64-bit PCI-X slots 4 and 5 and the integrated SCSI controller with RAID capabilities are on PCI bus D.
  - Hot-plug, 133 MHz 64-bit PCI-X slot 6 is on PCI bus F.

  Note: If an optional ServeRAID controller is installed, it overrides the standard functionality of the integrated SCSI controller with RAID capabilities. The ServeRAID controller must be installed in its dedicated connector on the system board.
- The system scans PCI and PCI-X slots 1 through 6 to assign system resources. The system then starts (boots) the system devices in the following order, if you have not changed the default boot precedence: integrated Ethernet controller, integrated SCSI controller with RAID capabilities, and then PCI and PCI-X slots 1 through 6.

  Note: To change the boot precedence for PCI and PCI-X devices, start the Configuration/Setup Utility program and select **Start Options** from the main menu. See the *User's Guide* on the IBM *xSeries Documentation* CD for details about using the Configuration/Setup Utility program.
- The server uses a rotational interrupt technique to configure PCI adapters so that you can install PCI adapters that do not support sharing of PCI interrupts.

Complete the following steps to install an adapter:

Note: If you are installing a hot-plug adapter go to "Installing a hot-plug adapter (slot 6)" on page 19.

1. Read the safety information beginning on page vii, and "Installation guidelines" on page 7.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables. Remove the cover.
3. See the documentation that comes with the adapter for any cabling instructions and information about jumper or switch settings. (It might be easier for you to route cables before you install the adapter.)
4. Lift the adapter-retention latch and remove the expansion-slot cover.

Backup expansion-slot screws

Adapter-retention latch

Expansion-slot cover

Adapter

Adapter-retention clip

Adapter-support bracket
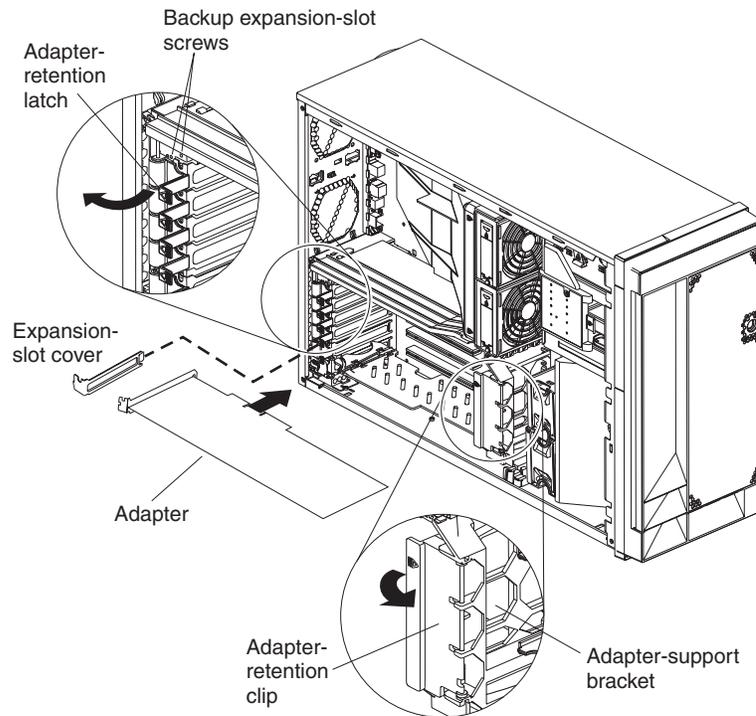
5. If you are installing a full-length adapter, remove the blue adapter guide (if any) from the end of the adapter; then, lift the adapter-retention clip on the adapter-support bracket. Otherwise, continue with the next step.

Adapter guide
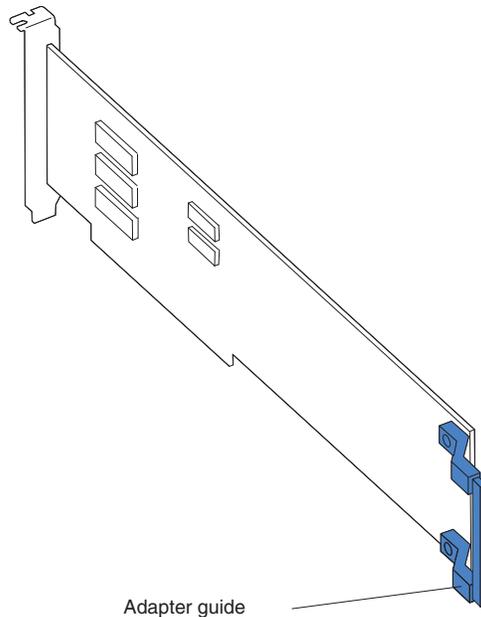
6. Press the adapter *firmly* into the expansion slot, lower the adapter-retention latch, and make sure that the latch is in the locked (closed) position.

   Attention: Incomplete insertion might cause damage to the system board or the adapter.

7. Connect any needed cables to the adapter.

8. If you have other options to install or remove, do so now.

9. Replace the cover. Go to "Completing the installation" on page 22.

Installing a hot-plug adapter (slot 6)

You do not have to turn off the server to install a hot-plug adapter in slot 6. However, you must turn off the server when performing any steps that involve installing or removing cables.

The following illustration shows how to install a PCI or PCI-X hot-plug adapter.
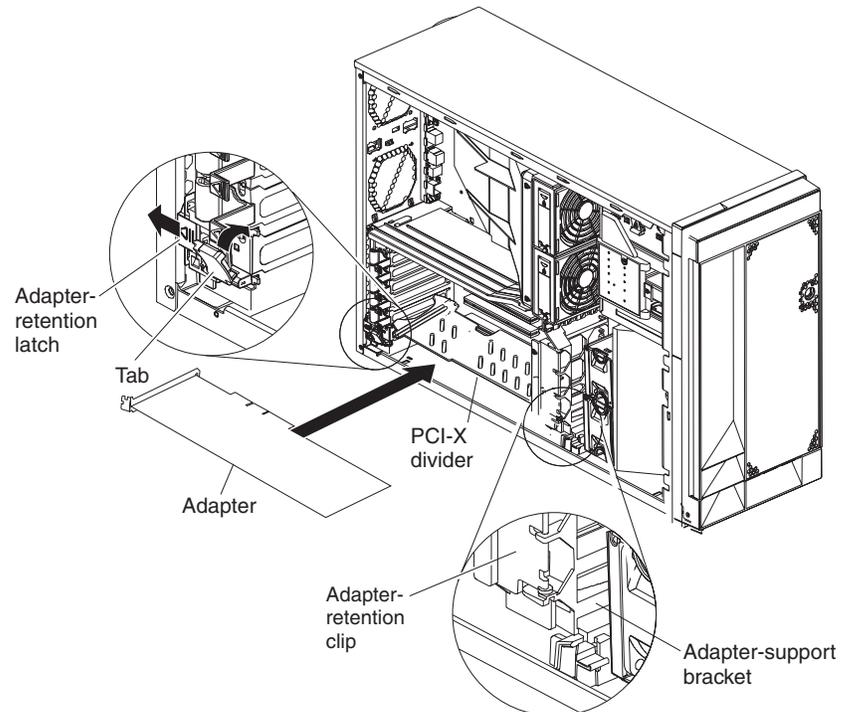
Complete the following steps to install a hot-plug PCI or PCI-X adapter:

1. Read the safety information beginning on page vii, and "Installation guidelines" on page 7.

2. Remove the cover.

3. Open the adapter-retention latch and remove the expansion-slot cover.

   Attention: Expansion slot covers must be installed on all empty slots. This maintains the electronic emissions characteristics of the server and ensures proper cooling of system components.

4. If you are installing a full-length adapter, remove the blue adapter guide (if any) from the end of the adapter; then, lift the adapter-retention clip on the adapter-support bracket. Otherwise, continue with the next step.

Adapter guide
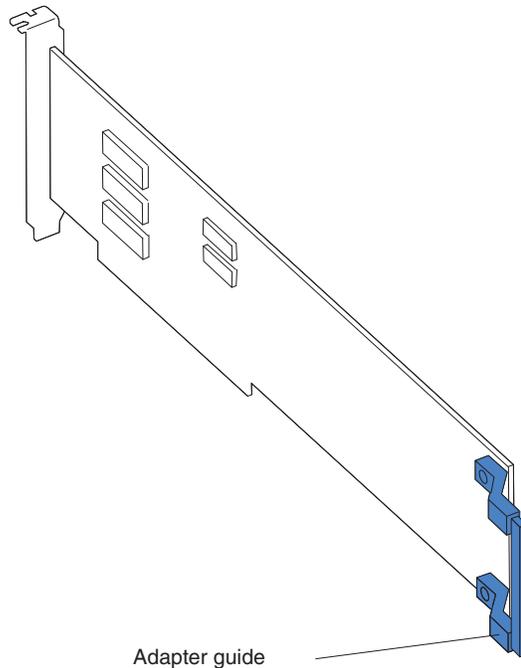
5. See the documentation that comes with the adapter for any cabling instructions and information about jumper or switch settings.

    Attention: Incomplete insertion might cause damage to the system board or the adapter.

6. Press the adapter *firmly* into the expansion slot.

7. Close the adapter-retention latch and if necessary, the adapter-retention clip.

    Important: Power cannot be provided to the adapter slot if the latch is not lowered into place.

8. Connect any needed cables to the adapter.

    Note: See the documentation that comes with the operating system for information about enabling a hot-plug PCI-X slot.

9. If you have other options to install or remove, do so now.

10. Replace the cover. Go to "Completing the installation" on page 22.

Installing an IBM Remote Supervisor Adapter II SlimLine

The optional IBM Remote Supervisor Adapter II SlimLine must be installed in its dedicated connector on the system board. See the illustration on page 22 for the location of the connector on the system board. The Remote Supervisor Adapter II SlimLine is not cabled to the system board.

Complete the following steps to install the Remote Supervisor Adapter II SlimLine:

1. Read the safety information beginning on page vii, and "Installation guidelines" on page 7.

2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables. Remove the cover and air baffle assembly.

3. Assemble the Remote Supervisor Adapter II SlimLine and Interposer card:

Connector

Standoffs

Interposer card

Mounting hole

Standoffs

Mounting hole

Remote Supervisor
Adapter II SlimLine
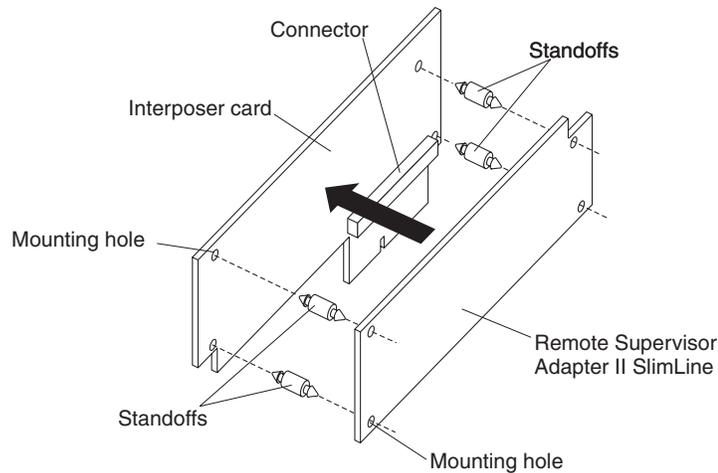
    a. Insert the standoffs that come with the option into the mounting holes in the Remote Supervisor Adapter II SlimLine.

    b. Align the mounting holes in the Interposer card with the standoffs; then, align the connector on the card with the connector on the Remote Supervisor Adapter II SlimLine.

    c. Press the Interposer card and Remote Supervisor Adapter II SlimLine together until they snap together.

4. Press the Remote Supervisor Adapter II SlimLine guide into place on the system board.

Remote Supervisor Adapter II SlimLine

Remote Supervisor Adapter II SlimLine guide

Remote Supervisor Adapter II SlimLine connector
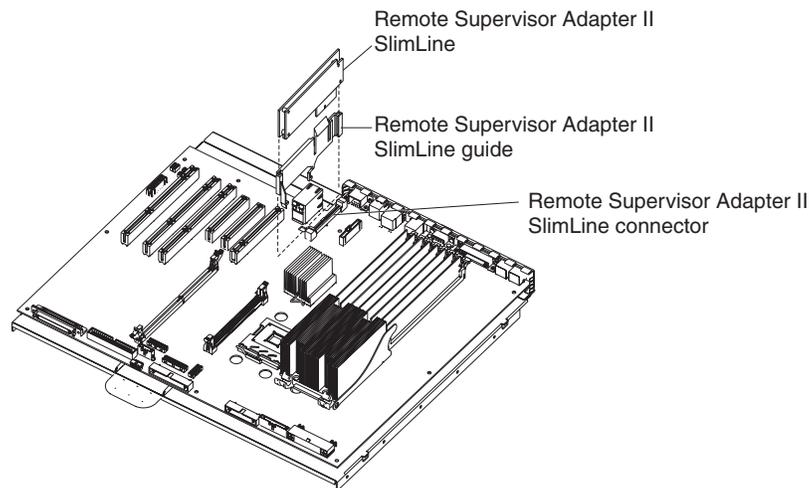
5. Position the entire adapter assembly so that the edge connector on the Interposer card is at the rear of the server.

6. Carefully grasp the assembly by its top edge or upper corners, and align it with the Remote Supervisor Adapter II SlimLine guide and the connector on the system board.

    Attention: Incomplete insertion might cause damage to the system board or the adapter.

7. Press the assembly firmly into the connector and under the retention latch on the Remote Supervisor Adapter II SlimLine guide.

8. If you have other options to install or remove, do so now.

9. Replace the air-baffle assembly and cover. Go to "Completing the installation" on page 22.

Installing the ServeRAID-7k adapter

The optional ServeRAID-7k adapter must be installed in its dedicated connector on the system board. See the following illustration for the location of the connector on the system board. The ServeRAID-7k adapter is not cabled to the system board and no rerouting of the SCSI cable is required.

Complete the following steps to install the ServeRAID-7k adapter:
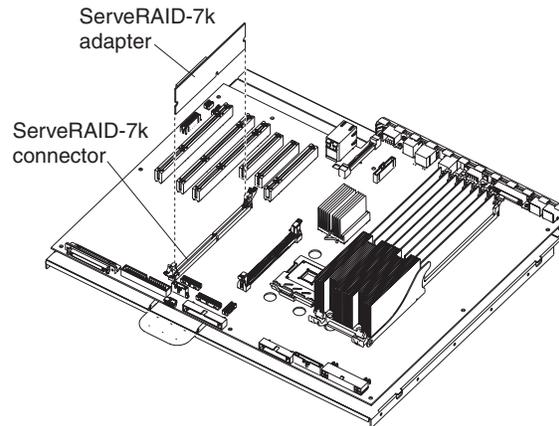
1. Read the safety information beginning on page vii, and "Installation guidelines" on page 7.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables. Remove the cover and air baffle assembly.

   Attention: To avoid breaking the retaining clips or damaging the ServeRAID-7k adapter connector, open and close the clips gently.
3. Open the retaining clip on each end of the ServeRAID-7k adapter connector.
4. Touch the static-protective package containing the ServeRAID-7k adapter to any unpainted metal surface on the server. Then, remove the ServeRAID-7k adapter from the package.
5. Turn the ServeRAID-7k adapter so that the ServeRAID-7k adapter keys align correctly with the connector. The green battery pack of the ServeRAID-7k adapter should be facing away from the microprocessor sockets.

   Attention: Incomplete insertion might cause damage to the system board or the ServeRAID-7k adapter.
6. Press the ServeRAID-7k adapter firmly into the connector.
7. If you have other options to install or remove, do so now.
8. Replace the air-baffle assembly and cover. Go to "Completing the installation."

Completing the installation

Complete the following steps to complete the installation:
1. Install the bezel, cover, and door.
2. Connect the cables and power cords. See "Connecting the cables" for more information.

Connecting the cables

Notes:
1. Make sure you turn off the server before connecting any cables to or disconnecting any cables from the server or hot-plug adapter.

2. For additional cabling instructions, see the *User's Guide* on the IBM *xSeries Documentation* CD and the documentation that comes with the options. It might be easier for you to route any cables before you install certain options.

3. Cable identifiers are printed on the cables that come with the server and options. Use these identifiers to connect the cables to the correct connectors. For example, the hard disk drive cables are labeled "HDD option."

Two cable-restraint brackets are on the rear of the server. Route the power cord through the power-cord restraint bracket. After you connect the cables to the selected devices, route the cables (for example, the cables that are connected to the I/O connectors) through the I/O cable-restraint bracket.

The following illustration shows the location of the input and output connectors on the rear of the server.

Note: The USB 3 connector is on the front of the server. (See "Front view" on page 25 for the USB 3 connector location.)
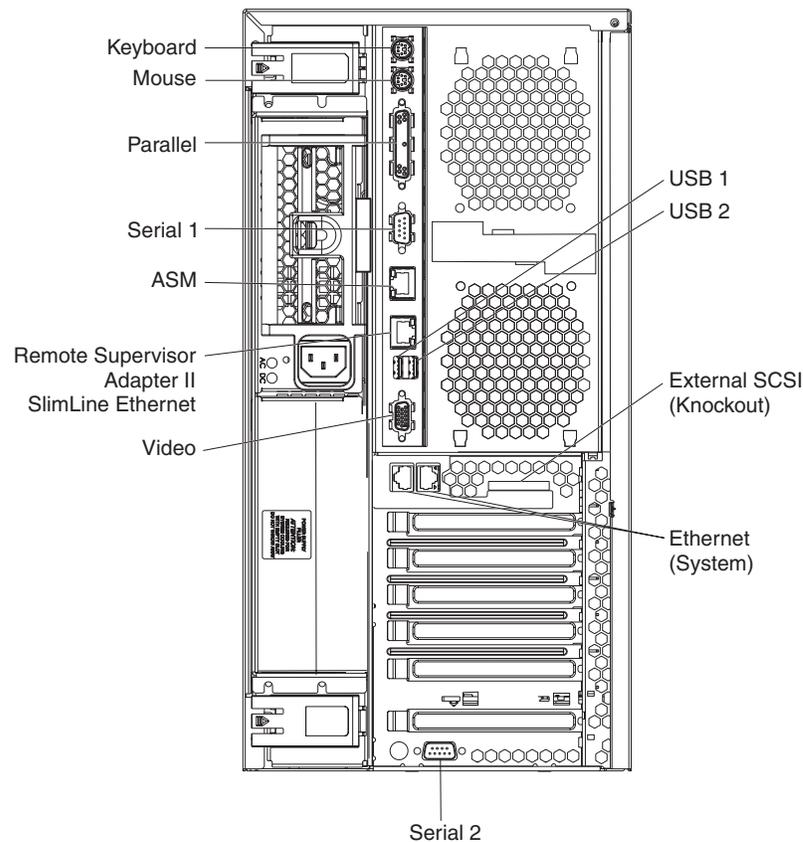
Updating the server configuration

When you start the server for the first time after you add or remove an internal option or external SCSI device, you might receive a message that the configuration has changed. The Configuration/Setup Utility program starts automatically so that you can save the new configuration settings. For more information, see the section about configuring the server in the *User's Guide* on the IBM *xSeries Documentation* CD.

Some options have device drivers that you must install. See the documentation that comes with each option for information about installing device drivers.

The server comes with at least one microprocessor. If more than one microprocessor is installed, the server can operate as a symmetric multiprocessing (SMP) server. You might have to upgrade the operating system to support SMP. For more information, see the section about using the *ServerGuide Setup and Installation* CD in the *User's Guide* and the operating-system documentation.

If the server has an optional RAID adapter and you have installed or removed a hard disk drive, see the documentation that comes with the RAID adapter for information about reconfiguring the disk arrays.

If you have installed a Remote Supervisor Adapter II SlimLine to manage the server remotely, see the *Remote Supervisor Adapter II SlimLine User's Guide*, which comes with the option, for information about setting up, configuring, and using the option.

For information about configuring the integrated Gigabit Ethernet controller, see the *User's Guide*.

Chapter 3. Server controls, LEDs, and power

This chapter describes the controls and light-emitting diodes (LEDs) and how to turn the server on and off.

Front view

The following illustration shows the controls, LEDs, and connectors on the front of the server.

Note: The front bezel door is not shown so that the drive bays are visible.
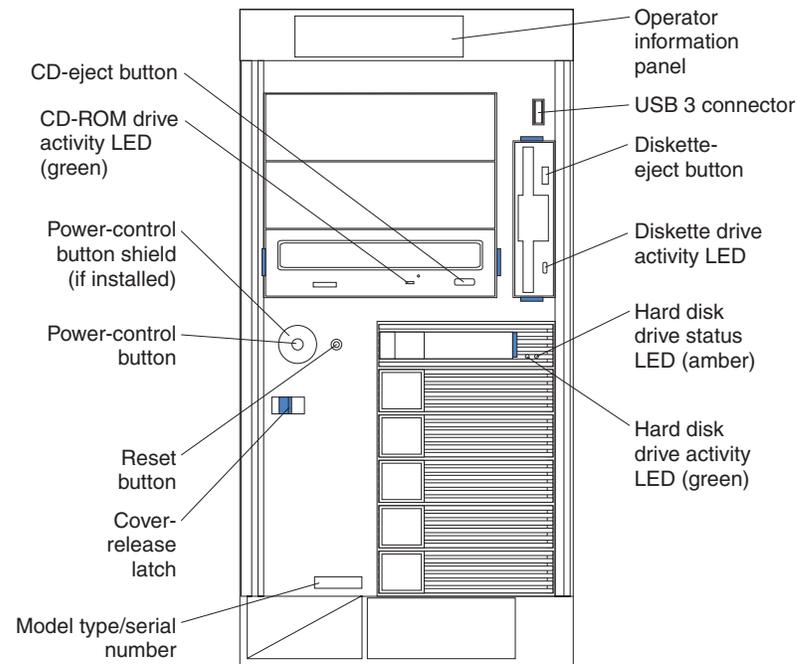
Operator information panel: This panel contains LEDs. The following illustration shows the LEDs on the operator information panel.
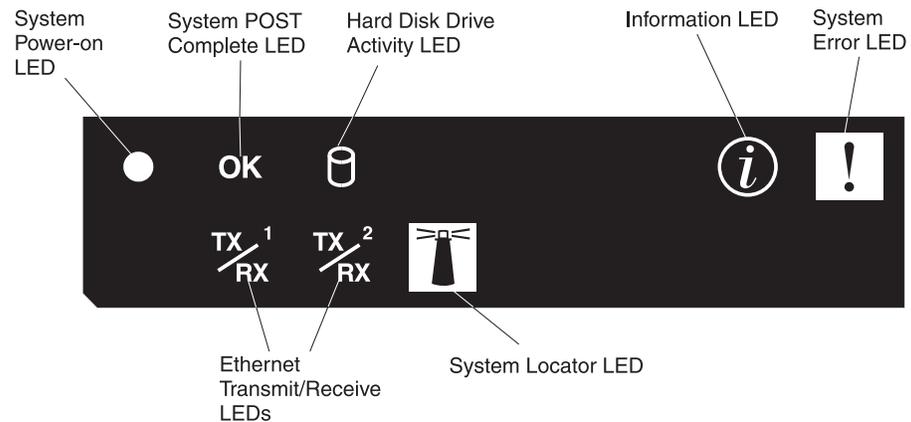
The following LEDs are on the operator information panel:

- **System Power-on LED:** When this LED is lit and not flashing, it indicates that the server is turned on. When this LED is flashing, it indicates that the server is turned off and still connected to an ac power source. When this LED is off, it indicates that ac power is not present, or the power supply or the LED itself has failed. A power LED is also on the rear of the server.
- **System POST-complete LED:** When this green LED is lit, it indicates POST was completed without any errors.
- **Hard Disk Drive activity LED:** When this green LED is flashing rapidly, it indicates that there is activity on a hard disk drive.
- **System-information LED:** When this amber LED is on, the server power supplies are nonredundant, or some other noncritical event has occurred. The event is recorded in the error log. Check the light path diagnostic panel for more information (see the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD).
- **System-error LED:** When this amber LED is lit, it indicates that a system error has occurred. Use the diagnostic LED panel and the system service label on the inside of the left-side cover to further isolate the error. See the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD for additional information.
- **System locator LED:** Use this LED to visually locate the server among other servers. You can use IBM Director to light this LED remotely.
- **Ethernet transmit/receive activity LED (Tx/Rx 1 or Tx/Rx 2):** When these two green LEDs are lit, they indicate that there is activity between the server and the network.

USB 3 connector: Connect a USB device to this connector.

Diskette-eject button: Press this button to release a diskette from the diskette drive.

Diskette drive activity LED: When this LED is lit, it indicates that the diskette drive is in use.

Hard disk drive activity LED: When this LED is flashing, it indicates that the associated hard disk drive is in use.

Hard disk drive status LED: When this LED is lit, it indicates that the associated hard disk drive has failed. If an optional RAID adapter is installed in the server and the LED flashes slowly (one flash per second), the drive is being rebuilt. If the LED flashes rapidly (three flashes per second), the controller is identifying the drive.

Reset button: Press this button to reset the server and run the power-on self-test (POST). You might have to use a pen or the end of a straightened paper clip to press the button.

Power-control button: Press this button to turn the server on and off manually. A power-control-button shield comes with the server. You can install this disk-shaped shield to prevent the server from being turned off accidentally.

Power-control-button shield: You can install this circular disk over the power-control button to prevent the server from being turned off accidently.

CD-ROM drive activity LED: When this LED is lit, it indicates that the CD-ROM drive is in use.

CD-eject button: Press this button to release a CD from the CD-ROM drive.

Rear view

The following illustration shows the connectors and LEDs on the rear of the server.

Keyboard connector

Mouse connector

ASM

Parallel connector

Ethernet link LED

Serial 1 connector

Remote Supervisor
Adapter II
SlimLine Ethernet

Ethernet activity LED

USB 1 connector

Power cord connector

Ethernet link 2
status LED

AC power LED

DC power LED

Ethernet connectors 1 and 2

USB 2 connector

Ethernet link 1
status LED

Video connector
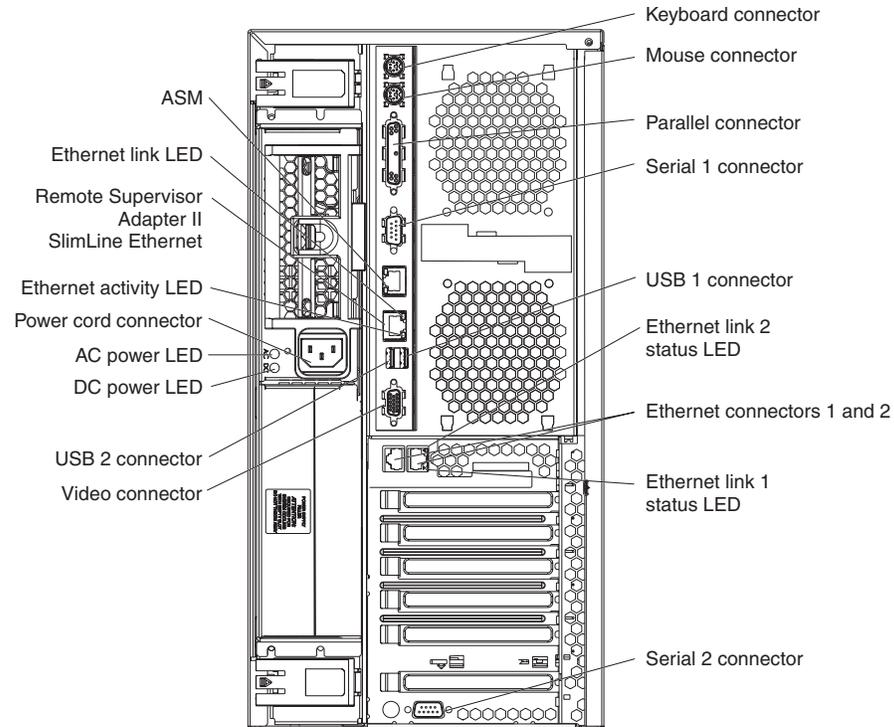
Serial 2 connector

Keyboard connector: Connect a PS/2® keyboard to this connector.

Mouse connector: Connect a mouse or other PS/2 device to this connector.

Parallel connector: Connect a parallel device to this connector.

Serial 1 connector: Connect a 9-pin serial device to this connector.

USB 1 connector: Connect a USB device to this connector.

Ethernet link 1 status LED: This LED is on the Ethernet connector. When this LED is lit, there is an active connection on the Ethernet port 1.

Ethernet connectors 1 and 2: Use these connectors to connect the server to a network.

Ethernet link 2 status LED: This LED is on the Ethernet connector. When this LED is lit, there is an active connection on the Ethernet port 2.

Serial 2 connector: Connect a 9-pin serial device to this connector.

Video connector: Connect a monitor to this connector.

USB 2 connector: Connect a USB device to this connector.

DC power LED: This green LED provides status information about the power supply. During typical operation, both the ac and dc power LEDs are lit. For any

other combination of LEDs, see the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD.

AC power LED: This green LED provides status information about the power supply. During typical operation, both the ac and dc power LEDs are lit. For any other combination of LEDs, see the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD.

Power-cord connector: Connect the power cord to this connector.

Ethernet Activity LED: This LED is on the Ethernet connector. When it flashes, it indicates that data is being transmitted or received between the server and the network device that is connected to the connector. The flashing frequency is proportional to the amount of traffic on the network link.

ASM: Use this connector to connect the server to an Advanced System Management (ASM) network.

Ethernet link status LED: This LED is on the Ethernet connector. When this LED is lit, there is an active connection on the Ethernet port.

Remote Supervisor Adapter II SlimLine Ethernet: Use this connector to connect the server to an optional Remote Supervisor Adapter II SlimLine installed in another server. This connector is enabled when the Remote Supervisor Adapter II SlimLine option is installed.

Server power features

When the server is connected to an ac power source but is not turned on, the operating system does not run, and all core logic except for the service processor is shut down; however, the server can respond to requests from the service processor (also called the baseboard management controller), such as a remote request to turn on the server. The power-on LED flashes to indicate that the server is connected to ac power but is not turned on.

Turning on the server

Approximately 20 seconds after the server is connected to ac power, the power-control button becomes active, one or more fans might start running, and you can turn on the server and start the operating system by pressing the power-control button.

The server can also be turned on in any of the following ways:

- If a power failure occurs while the server is turned on, the server will restart automatically when power is restored.
- If the server is connected to an Advanced System Management interconnect network that contains at least one server with an optional Remote Supervisor Adapter II SlimLine installed, the server can be turned on from the Remote Supervisor Adapter user interface.
- If your operating system supports the systems-management software for an optional Remote Supervisor Adapter II SlimLine, the systems-management software can turn on the server.
- If your operating system supports the Wake on LAN® feature, the Wake on LAN feature can turn on the server.

Note: When 4 GB or more of memory (physical or logical) is installed, some memory is reserved for various system resources and is unavailable to the operating system. The amount of memory that is reserved for system resources depends on the operating system, the configuration of the server, and the configured PCI options.

Turning off the server

When you turn off the server and leave it connected to ac power, the server can respond to requests from the service processor, such as a remote request to turn on the server. While the server remains connected to ac power, one or more fans might continue to run. To remove all power from the server, you must disconnect it from the power source.

Some operating systems require an orderly shutdown before you turn off the server. See your operating-system documentation for information about shutting down the operating system.

Statement 5:

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.
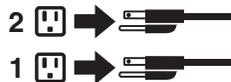
The server can be turned off in any of the following ways:

- You can turn off the server from the operating system, if your operating system supports this feature. After an orderly shutdown of the operating system, the server will be turned off automatically.
- You can press the power-control button to start an orderly shutdown of the operating system and turn off the server, if your operating system supports this feature.
- If the operating system stops functioning, you can press and hold the power-control button for more than 4 seconds to turn off the server.
- If the server is connected to an Advanced System Management interconnect network that contains at least one server with an optional Remote Supervisor Adapter II SlimLine installed, the server can be turned off from the Remote Supervisor Adapter II SlimLine user interface.
- If an optional Remote Supervisor Adapter II SlimLine is installed in the server, the server can be turned off from the Remote Supervisor Adapter II SlimLine user interface.
- If the Wake on LAN feature turned on the server, the Wake on LAN feature can turn off the server.
- The integrated system management processor can turn off the server as an automatic response to a critical system failure.
- You can turn off the server through a request from the service processor.

Chapter 4. Configuring the server

The *ServerGuide Setup and Installation* CD provides software setup tools and installation tools that are specifically designed for your IBM server. Use this CD during the initial installation of the server to configure basic hardware features and to simplify the operating-system installation.

In addition to the *ServerGuide Setup and Installation* CD, you can use the following configuration programs to customize the server hardware:
- Configuration/Setup Utility program
- Baseboard management controller utility programs
- SCSISelect Utility program for Adaptec® HostRAID™ configuration

For more information about these programs, see "Configuring the server" in the *User's Guide* on the IBM *xSeries Documentation* CD.

Using the ServerGuide Setup and Installation CD

The *ServerGuide Setup and Installation* CD provides state-of-the-art programs to detect the server model and installed hardware options, configure the server hardware, provide device drivers, and help you install the operating system. For information about the supported operating-system versions, see the label on the CD. If the *ServerGuide Setup and Installation* CD did not come with the server, you can download the latest version from http://www.ibm.com/pc/qtechinfo/MIGR-4ZKPPT.html.

Complete the following steps to start the *ServerGuide Setup and Installation* CD:
1. Insert the CD, and restart the server. If the CD does not start, see "ServerGuide problems" on page 45.
2. Follow the instructions on the screen to:
   a. Select your language.
   b. Select your keyboard layout and country.
   c. View the overview to learn about ServerGuide features.
   d. View the readme file to review installation tips about your operating system and adapter.
   e. Start the setup and hardware configuration programs.
   f. Start the operating-system installation. You will need your operating-system CD.

Using the Configuration/Setup Utility program

The Configuration/Setup Utility program is part of the BIOS code. You can use it to:
- Change interrupt request (IRQ) settings
- Change the startup drive sequence
- Configure serial-connector assignments
- Enable USB keyboard and mouse support
- Resolve configuration conflicts
- Set the date and time
- Set passwords and security settings

Complete the following steps to start the Configuration/Setup Utility program:

1. Turn on the server.
2. When the message `Press F1 for Configuration/Setup` appears, press F1. If an administrator password has been set, you must type the administrator password to access the full Configuration/Setup Utility menu.
3. Follow the instructions on the screen.

Using the baseboard management controller utility programs

Use the baseboard management controller utility programs to configure the baseboard management controller, download the firmware and sensor data record/field replacable unit (SDR/FRU) data, and remotely manage a network.

Using the baseboard management controller setup utility program

Use the baseboard management controller setup utility program to view or change baseboard management controller information, user management, LAN configuration, and LAN alert settings.

Go to http://www.ibm.com/pc/support/ to download the program; then, copy the files bmc.exe and Init.ini to a setup utility diskette.

Complete the following steps to start the baseboard management controller setup utility program:

1. Turn on the server.
2. Insert the setup utility diskette into the diskette drive.
3. From a command line, type `bmc` and press Enter.

Note: The Intf.ini file parameters must be set correctly for the utility program to interface with the baseboard management controller. To modify the Init.ini file, select **0** from the main menu and use the arrow keys to select values for the following parameters:

- **System Interface:** This is the interface through which system software sends and receives messages to and from the baseboard management controller. Select **KCS** (keyboard controller style).
- **Port Address:** This is the base address for the system interface.
- **Register Spacing:** Select **ByteBoundary**, **ThirtyTwoBitBoundary**, or **SixteenBitBoundary**.
- **Channel Number:** Use the arrow keys to select the channel number (0-15).
- **DHCP Mode:** This is the LAN configuration address source.

Using the baseboard management controller configuration utility program

Use the baseboard management controller configuration utility program to view or change the baseboard management controller configuration settings and to save the configuration to a file for use on multiple servers.

Go to http://www.ibm.com/pc/support/ to download the utility program; then, copy the file bmc_cfg.exe to a configuration utility diskette.

Complete the following steps to start the baseboard management controller configuration utility program:

1. Turn on the server.

2. Insert the configuration utility diskette into the diskette drive.

3. From a command line, type `bmc_cfg` and press Enter.

Note: The Int.ini file parameters must be set correctly for the utility program to interface with the baseboard management controller. To modify the Int.ini file, use the baseboard management controller setup utility program or a text editor.

Using the baseboard management controller firmware update utility program

Use the baseboard management controller firmware update utility program to download a baseboard management controller firmware update. This program updates the baseboard management controller firmware only and does not affect any device drivers.

Go to http://www.ibm.com/pc/support/ to download the program; then, copy the file Flash.exe to a firmware update diskette.

To update the firmware, use one of the following procedures:

*   If the Linux or Windows operating-system update package is available from the World Wide Web and you have obtained the applicable update package, follow the instructions that come with the update package.

*   If you are using a diskette, complete the following steps:

    1. Turn on the server.

    2. Insert the firmware update diskette into the diskette drive.

    3. From a command line, type `flash -?` and press Enter.

        Important:

        a. To ensure proper server operation, be sure to update the server baseboard management controller firmware before updating the BIOS code.

        b. The Int.ini file parameters must be set correctly for the utility program to interface with the baseboard management controller. Use the baseboard management controller setup utility program or a text editor to modify the Init.ini file.

Using the baseboard management controller SDR/FRU update utility program

Use the baseboard management controller SDR/FRU update utility program to download an SDR/FRU update.

Go to http://www.ibm.com/pc/support/ to download the program; then, copy the file fsloader.exe to an SDR/FRU update diskette.

Complete the following steps to start the baseboard management controller SDR/FRU update utility program:

1. Turn on the server.

2. Insert the SDR/FRU update diskette into the diskette drive.

3. From a command line, type `fsloader -?` and press Enter.

Using the baseboard management controller management utility program

Use the baseboard management controller management utility program to remotely manage and configure a server network. The following features are available from the program:

- **IPMI (Intelligent Platform Management Interface) Shell**

  Use this feature to remotely perform power-management and system identification control functions over a LAN or serial port interface from a command-line interface. Use this feature also to remotely view the event log.

- **Serial over LAN Proxy**

  Use this feature to remotely perform control and management functions over a Serial over LAN network. Use this feature also to remotely view and change the BIOS settings.

To download the utility program and create the baseboard management controller management utility CD, go to http://www.ibm.com/pc/support/. The CD provides information about installing and using the program.

Using the SCSISelect Utility program for Adaptec HostRAID configuration

Use the SCSISelect Utility program to add RAID level-0, level-1, and level-10 functionality. Installing a ServeRAID-7k enables the SCSI controller to provide additional RAID levels. This utility is part of the BIOS code in the server.

The SCSI RAID feature comes disabled by default. You must enable it and install the device drivers before you can use it. SCSI RAID configuration utilities, device drivers, and information are available on the *ServeRAID-7e (Adaptec HostRAID) Support* CD. If this CD did not come with your server, you can download the IBM *ServeRAID-7e* (*Adaptec HostRAID*) Support CD from the IBM Web site at http://www.ibm.com/pc/support/.

Enabling the SCSI HostRAID feature

Complete the following steps to enable the SCSI HostRAID feature:

1. Turn on the server.
2. When the prompt `Press <CTRL><A> for SCSISelect Utility` appears, press Ctrl+A. If you have set an administrator password, you are prompted to type the password.
3. Use the arrow keys to select the channel for which you want to change settings and press Enter.
4. Select **Configure/View SCSI Controller Setting**; then, select **HostRAID**.
5. Select **Enabled**.
6. Press Esc; then, select **Yes** to save the changes.

Using the SCSI HostRAID feature to perform a RAID level-0 configuration

The instructions in this section describe how to access the SCSI HostRAID feature from the SCSISelect Utility program and perform an initial RAID level-0 configuration. If you install a different type of RAID adapter in the server, use the configuration method described in the instructions that come with that adapter to view or change SCSI settings for attached devices.

See the documentation on the *ServeRAID-7e (Adaptec HostRAID) Support* CD for additional information about how to use the SCSI HostRAID feature.

Configuring the controller

Complete the following steps to use the SCSI HostRAID feature to configure a RAID level-0 array:

Note: You must have at least two hard disk drives installed in the server to configure a RAID level-0 array.

1. From the SCSISelect main menu, select **Configure/View HostRAID Settings**.
2. From the list of ready drives, type C to create an array.
3. Select **RAID-0** when asked to select the RAID type.
4. From the list of ready drives, select the two drives that you want to group into the array.
5. Select **Stripe Size**.
6. Select **Yes** if the array is bootable.
7. Select **Yes** to create the array.
8. Press Esc to exit the utility.
9. Restart the server.

Using the SCSI HostRAID feature to perform a RAID level-1 configuration

The instructions in this section describe how to access the SCSI HostRAID feature from the SCSISelect Utility program and perform an initial RAID level-1 configuration. If you install a different type of RAID adapter in the server, use the configuration method described in the instructions that come with that adapter to view or change SCSI settings for attached devices.

See the documentation on the *ServeRAID-7e (Adaptec HostRAID) Support* CD for additional information about how to use the SCSI HostRAID feature.

Configuring the controller

Complete the following steps to use the SCSI HostRAID feature to configure a RAID level-1 array:

Note: You must have at least two hard disk drives installed in the server to configure a RAID level-1 array.

1. From the SCSISelect main menu, select **Configure/View HostRAID Settings**.
2. From the list of ready drives, type C to create an array.
3. Select **RAID-1** when asked to select the RAID type.
4. From the list of ready drives, select the two drives that you want to group into the array.
5. Select **Create new RAID-1**.
6. Type an identifier for the array.
7. Select **Yes** if the array is bootable.
8. Select **Yes** to create the array.
9. Press Esc to exit the utility.
10. Restart the server.

Using the SCSI HostRAID feature to perform a RAID level-10 configuration

The instructions in this section describe how to access the SCSI HostRAID feature from the SCSISelect Utility program and perform an initial RAID level-10 configuration. If you install a different type of RAID adapter in the server, use the configuration method described in the instructions that come with that adapter to view or change SCSI settings for attached devices.

See the documentation on the *ServeRAID-7e (Adaptec HostRAID) Support* CD for additional information about how to use the SCSI HostRAID feature.

Configuring the controller

Complete the following steps to use the SCSI HostRAID feature to configure a RAID level-10 array:

Note: You must have at least four hard disk drives installed in the server to configure a RAID level-10 array.

1. From the SCSISelect main menu, select **Configure/View HostRAID Settings**.
2. From the list of ready drives, type C to create an array.
3. Select **RAID-10** when asked to select the RAID type.
4. From the list of ready drives, select the drives that you want to group into the array.
5. Select **Stripe Size**.
6. Type an identifier for the array.
7. Select **Yes** if the array is bootable.
8. Select **Yes** to create the array.
9. Press Esc to exit the utility.
10. Restart the server.

Viewing the configuration

You can use the SCSISelect Utility program to view information about the SCSI controller. From the list of available arrays, select an array and press Enter. Press Esc to exit the utility.

Using ServeRAID Manager

You can use the ServeRAID Manager program, which is on the *IBM ServeRAID Support* CD, to:

- Configure a redundant array of independent disks (RAID) array
- Restore a SCSI hard disk drive to factory-default settings, erasing all data from the disk
- View the RAID configuration and associated devices
- Monitor operation of the RAID controllers

The ServeRAID Manager program operates in two ways:

- Startable-CD mode
- As an installed software program

See the ServeRAID documentation on the IBM ServeRAID Support CD for additional information about RAID technology and instructions for using ServeRAID Manager.

The *Installation Guide* for the server also contains instructions for using ServeRAID Manager to configure the integrated SCSI controller with RAID capabilities.

Notes:

1. The integrated SCSI controller with RAID capabilities supports only RAID level-0, RAID level-1, and RAID level-10. Installing an optional ServeRAID-7k controller provides support for additional RAID levels.

2. If you install a different type of RAID adapter in the server, use the configuration method described in the instruction that come with that adapter to view or change SCSI settings for attached devices.

Before you install your operating system, you must configure the SCSI or ServeRAID controller. You must use the configuration program on the *IBM ServeRAID Support* CD to configure the integrated SCSI controller with RAID capabilities or to configure an optional IBM ServeRAID controller.

Notes:

1. You cannot use the *ServerGuide Setup and Installation* CD to configure the optional controllers.

2. To update the firmware and BIOS code for an optional ServeRAID controller, you must use the *IBM ServeRAID Support* CD that comes with the ServeRAID option.

Configuring the controller

You can use the Configuration wizard to configure your controller. The Configuration wizard provides two configuration options: Express and Custom. Express configuration automatically configures your controller, and you can use Custom configuration to configure your controller manually.

Note: If the integrated RAID controller has two channels, it will appear in the ServeRAID Manager tree as two controller objects. However, you can configure only one array and one RAID level-1 logical drive.

Using Express configuration

Express configuration automatically configures your controller. It creates an array by grouping together the first two physical drives that appear in the ServeRAID Manager tree, and it creates a RAID level-1 logical drive.

Complete the following steps to use Express configuration:

1. In the ServeRAID Manager tree, click the controller.
2. Click **Express configuration**.
3. Click **Next**. The "Configuration summary" window opens.
4. Review the information that is displayed in the "Configuration summary" window. To change the configuration, click **Modify arrays**.

Figure 1. "Configuration summary" window

5. Click **Apply**; then, click **Yes** when asked if you want to apply the new configuration. The configuration is saved in the controller and in the physical drives.

6. Exit from the ServeRAID Manager program and remove the CD from the CD-ROM drive.

7. Restart the server.

Using Custom configuration

To configure your controller manually, select Custom configuration. Using Custom configuration, you can select which two physical drives you want to configure and create a hot-spare drive.

Complete the following steps to use Custom configuration:

1. In the ServeRAID Manager tree, click the controller.
2. Click **Custom configuration**.
3. Click **Next**. The "Create arrays" window opens.
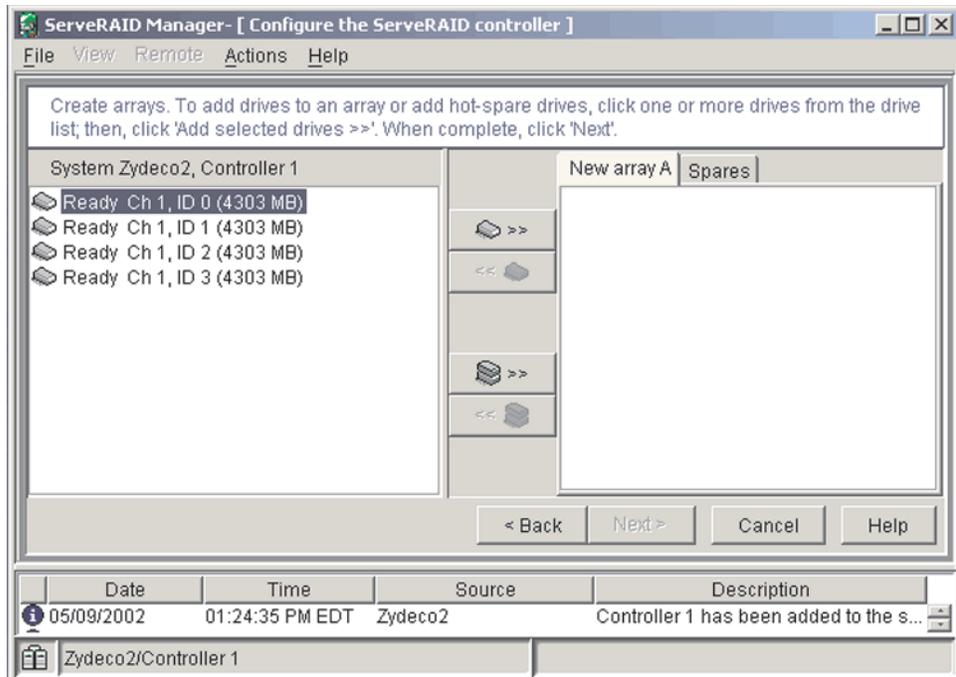
Figure 2. "Create arrays" window

4. From the list of ready drives, select the two drives you want to move to the array.

5. Click (`Add selected drives`) to add the drives to the array.

6. Complete the following steps if you want to configure a hot-spare drive:

   a. Click the **Spares** tab.

   b. Select the physical drive you want to designate as the hot-spare drive; then, click (`Add selected drives`).

7. Click **Next**. The "Configuration summary" window opens.
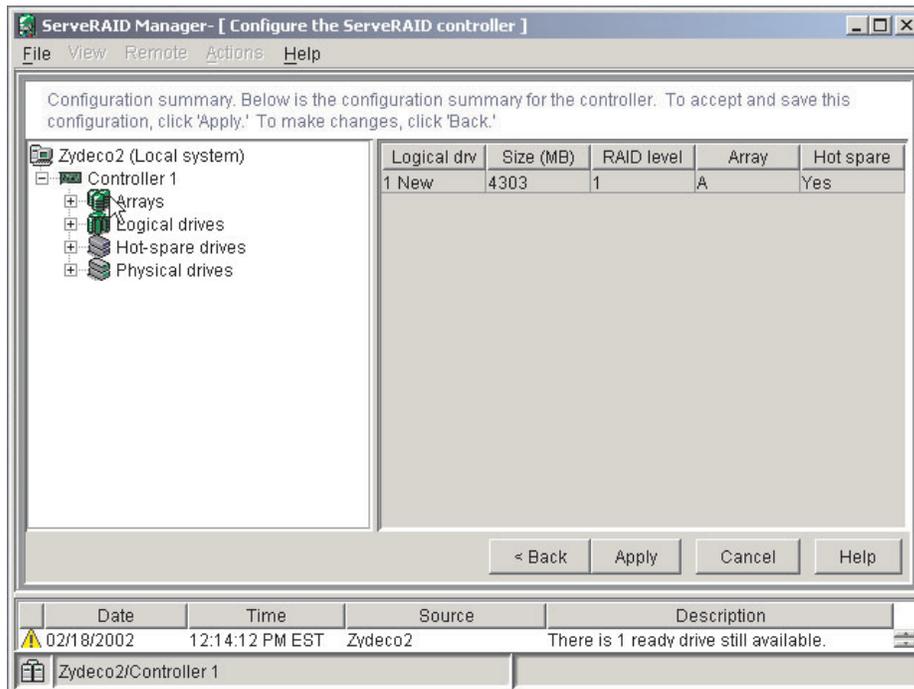
Figure 3. "Configuration summary" window

8. Review the information that is displayed in the "Configuration summary" window. To change the configuration, click **Back**.
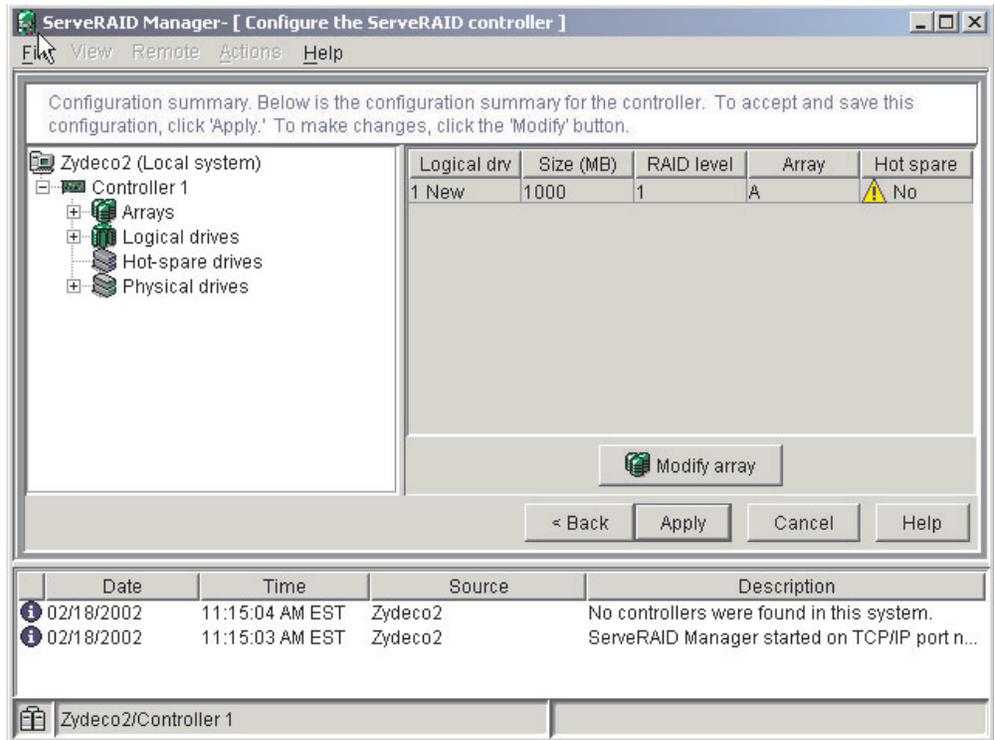
9. Click **Apply**; then, click **Yes** when asked if you want to apply the new configuration. The configuration is saved in the controller and in the physical drives.

10. Exit from the ServeRAID Manager program, and remove the CD from the CD-ROM drive.

11. Restart the server.

Using the PXE boot agent utility program

The Preboot Execution Environment (PXE) boot agent utility program is part of the BIOS code. You can use it to specify the startup order of devices and enable or disable operating-system wake-up support.

Note: The server does not support changing the network boot protocol or specifying the startup order of devices through the PXE boot agent utility program.

Complete the following steps to start the PXE boot agent utility program:

1. Turn on the server.

2. When the `Initializing Intel (R) Boot Agent Version X.X.XX PXE 2.0 Build XXX (WfM 2.0)` prompt appears, press Ctrl+S. You have 2 seconds (by default) to press Ctrl+S after the prompt appears. If the prompt does not appear, use the Configuration/Setup Utility program to enable the Ethernet PXE/DHCP option.

3. Use the arrow keys and press Enter to select a choice from the menu.

4. Follow the instructions on the screen to change the settings of the selected items; then, press Enter.

Chapter 5. Updating IBM Director

If you plan to use IBM Director to manage the server, you must check for the latest applicable IBM Director updates and interim fixes.

Complete the following steps to install the IBM Director updates and any other applicable updates and interim fixes:

1. Check for the latest version of IBM Director:

    a. Go to
        http://www.ibm.com/pc/us/eserver/xseries/systems_management/dwnl.html.

    b. If a newer version of IBM Director than what comes with the server is shown in the drop-down list, follow the instructions on the Web page to download the latest version.

2. Install the IBM Director program.

3. Download and install any applicable updates or interim fixes for the server:

    a. Go to http://www.ibm.com.

    b. Click **Support & downloads**.

    c. Click **Downloads & drivers**.

    d. In the search field, type `director 8841` and click **Submit**.

    e. Select any applicable update or interim fix that you want to download.

    f. Click the file link for the executable file to download the file, and follow the instructions in the readme file to install the update or interim fix.

    g. Repeat steps 3e and 3f for any additional updates or interim fixes that you want to install.

Chapter 6. Solving problems

This chapter provides basic troubleshooting information to help you solve some common problems that might occur while you are setting up the server.

If you cannot locate and correct the problem using the information in this chapter, see Appendix A, "Getting help and technical assistance," on page 55, the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD, and the "Server Support" flowchart in the front of this document.

Diagnostic tools overview

The following tools are available to help you diagnose and solve hardware-related problems:

- **System POST-complete LED**

  When this green LED is lit, it indicates POST was completed without any errors.

- **POST beep codes**

  The power-on self-test beep codes indicate the detection of a problem.

  - One beep indicates successful completion of POST, with no errors.
  - More than one beep indicates that POST detected a problem. Error messages also appear during startup if POST detects a hardware-configuration problem.

    See "POST beep code descriptions" and the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD for more information.

- **Troubleshooting charts**

  These charts list problem symptoms and steps to correct the problems. See "Troubleshooting charts" on page 46 for more information.

- **Diagnostic programs and error messages**

  The system diagnostic programs are provided in electrically erasable programmable ROM (EEPROM) that is shared with BIOS. These programs test the major components of the server. See the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD for more information.

- **Light path diagnostics**

  Use light path diagnostics to diagnose system errors quickly. See "Light path diagnostics" on page 51 for more information.

POST beep code descriptions

POST emits one beep to signal successful completion. If POST detects a problem during startup, other beep codes might occur. Use the following beep code descriptions to help diagnose and solve problems that are detected during startup.

Note: See the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD for more information about the POST beep codes.

One beep
> POST was completed successfully without finding any errors.

Repeating long beeps
> A memory error has occurred. Make sure that all DIMMs are correctly installed.

One long beep and two short beeps

A video error has occurred, and the BIOS code cannot initialize the monitor screen to display additional information.

POST error messages

The following table provides an abbreviated list of the error messages that might appear during POST. See the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD for more information about the POST error messages.

Table 3. Abbreviated list of POST error messages

POST message	Failing device or problem found	Suggested action
161	The real-time clock battery has failed.	Replace the battery or call for service.
162	A device configuration has changed.	• Run the Configuration/Setup Utility program; then, exit, saving the configuration settings. • Make sure that optional devices are turned on and installed correctly.
163	The time of day has not been set.	Set the date and time.
201	The memory configuration has changed.	Make sure that DIMMs are fully seated and installed correctly.
289	A failing DIMM was disabled.	Make sure that DIMMs are supported by the server and that they are installed correctly.
301, 303	Keyboard and keyboard controller	Make sure that the keyboard cable is connected and that nothing is resting on the keyboard keys.
962	Parallel connector configuration error	Run the Configuration/Setup Utility program and make sure that the parallel connector setting is correct.
1162	Serial connector configuration conflict	Run the Configuration/Setup Utility program and make sure that the IRQ and I/O connector assignments that are needed by the serial connector are available.
00019*xxx*	Microprocessor *x* is not functioning or failed the built-in self-test.	Make sure that microprocessor *x* is installed correctly. If the problem remains, replace microprocessor *x*.
00180*xxx*	A PCI adapter requested a resource that is not available.	Run the Configuration/Setup Utility program and make sure that the resources that are needed by the PCI adapter are available.
012980*xx* 012981*xx*	Data for microprocessor *x*	Download and install the latest level of BIOS code.
I9990305	POST could not find an operating system.	Install an operating system.

ServerGuide problems

The following table lists problem symptoms and suggested solutions.

Table 4. ServerGuide Setup and Installation CD

Symptom	Suggested action
The *ServerGuide Setup and Installation* CD will not start.	• Make sure that the server supports the ServerGuide program and has a startable (bootable) CD-ROM (or DVD-ROM) drive. • If the startup (boot) sequence settings have been altered, make sure that the CD-ROM drive is first in the startup sequence. • If more than one CD-ROM drive is installed, make sure that only one drive is set as the primary drive. Start the CD from the primary drive.
The SCSI RAID program cannot view all installed drives, or the operating system cannot be installed.	• Make sure that there are no duplicate SCSI IDs or IRQ assignments. • Make sure that the hard disk drive is connected correctly.
The operating-system installation program continuously loops.	Make more space available on the hard disk.
The ServerGuide program will not start the operating-system CD.	Make sure that the operating-system CD is supported by the ServerGuide program. See the *ServerGuide Setup and Installation* CD label for a list of supported operating-system versions.
The operating system cannot be installed; the option is not available.	Make sure that the operating system is supported on the server. If the operating system is supported, either there is no logical drive defined (SCSI RAID systems) or the ServerGuide System Partition is not present. Run the ServerGuide program and make sure that setup is complete.

Troubleshooting charts

The following tables list problem symptoms and suggested solutions. See the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD for more detailed troubleshooting charts. If you cannot find the problem in these charts, run the diagnostic programs. If you have run the diagnostic programs or if running the tests does not reveal the problem, call for service.

CD-ROM drive problems

Symptom	Suggested action
The CD-ROM drive is not recognized.	Make sure that: • The IDE channel to which the CD-ROM drive is attached (primary or secondary) is enabled in the Configuration/Setup Utility program. If the server has a single IDE channel, only the primary channel can be used. • All cables and jumpers are installed correctly. • The correct device driver is installed for the CD-ROM drive. If the problem remains, call for service.
A CD is not working correctly.	Clean the CD. If the problem remains, call for service.
The CD-ROM drive tray is not working.	The server must be turned on for the CD-ROM drive tray to work. Insert the end of a straighten paper clip into the manual tray-release opening. If the problem remains, call for service.

Diskette drive problems

Symptom	Suggested action
The diskette drive activity LED stays lit, or the server bypasses the diskette drive.	If there is a diskette in the drive, make sure that: • The diskette drive cables are correctly and securely connected. • The diskette drive is enabled in the Configuration/Setup Utility program. • The diskette is good and not damaged. (Try another diskette if you have one.) • The diskette contains the necessary files to start the server. • Your software program is working correctly. If the problem remains, call for service.

Expansion enclosure problems

Symptom	Suggested action
The SCSI expansion enclosure used to work but does not work now.	Make sure that: • The cables for all external SCSI options are connected correctly. • The last device in each SCSI chain, or the end of the SCSI cable, is terminated correctly. • Any external SCSI devices are turned on. You must turn on external SCSI devices before turning on the server. For more information, see your SCSI expansion enclosure documentation.

General problems

Symptom	Suggested action
A cover lock is broken, an LED is not working, or a similar problem has occurred.	Call for service.

Hard disk drive problems

Symptom	Suggested action
Not all drives are recognized by the hard disk drive diagnostic test (the Fixed Disk test).	1. Remove the first drive that is not recognized and try the hard disk drive diagnostic test again. 2. If the remaining drives are recognized, replace the drive that you removed with a new one.
The server stops responding during the hard disk drive diagnostic test.	1. Remove the hard disk drive that was being tested when the server stopped responding and try the diagnostic test again. 2. If the hard disk drive diagnostic test runs successfully, replace the drive that you removed with a new one.

Intermittent problems

Symptom	Suggested action
A problem occurs only occasionally and is difficult to diagnose.	Make sure that: • All cables and cords are connected securely to the rear of the server and attached devices. • When the server is turned on, air is flowing from the rear of the server at the fan grille. If there is no airflow, the fan is not working. This can cause the server to overheat and shut down. • The SCSI bus and devices are configured correctly and the last external device in each SCSI chain is terminated correctly. If the problem remains, call for service.

Keyboard, mouse, or pointing-device problems

Symptom	Suggested action
All or some keys on the keyboard do not work.	• Make sure that the keyboard cable is securely connected to the server and that the keyboard and mouse cables are not reversed. • Make sure that the server and the monitor are turned on. • Try using another keyboard. If the problem remains, call for service.
The mouse or pointing device does not work.	• Make sure that the mouse or pointing-device cable is securely connected to the server and that the keyboard and mouse cables are not reversed. • Make sure that the mouse device drivers are installed correctly. • Make sure that the server and the monitor are turned on. • Try using another mouse or pointing device. If the problem remains, call for service.

Memory problems

Symptom	Suggested action
The amount of system memory that is displayed is less than the amount of installed physical memory.	Make sure that: • The DIMMs are seated correctly. • You have installed the correct type of memory. • If you changed the memory, you updated the memory configuration in the Configuration/Setup Utility program. • All banks of memory are enabled. The server might have automatically disabled a memory bank when it detected a problem, or a memory bank might have been manually disabled. Check the POST error log for error message 289: • If the DIMM was disabled by a system-management interrupt (SMI), replace the DIMM. • If the DIMM was disabled by the user or by POST, run the Configuration/Setup Utility program and enable the DIMM. • If this error remains, replace the DIMM. If the problem remains, call for service.

Microprocessor problems

Symptom	Suggested action
The server emits a continuous tone during POST.	The startup (boot) microprocessor is not working correctly. Make sure that the startup microprocessor is seated correctly. If it is, replace the startup microprocessor. If the problem remains, call for service.

Monitor problems

Some IBM monitors have their own self-tests. If you suspect a problem with your monitor, see the information that comes with the monitor for instructions for testing and adjusting the monitor. If you cannot diagnose the problem, call for service.

Symptom	Suggested action
The screen is blank.	Make sure that: • The server power cord is connected to the server and a working electrical outlet. • The monitor cables are connected correctly. • The monitor is turned on and the brightness and contrast controls are adjusted correctly. **Important:** In some memory configurations, the 3-3-3 beep code might sound during POST, followed by a blank monitor screen. If this occurs and the **Boot Fail Count** feature in the **Start Options** of the Configuration/Setup Utility program is enabled (its default setting), you must restart the server three times to force the BIOS to reset the configuration settings to the default configuration (the memory connector or bank of connectors enabled). If the problem remains, call for service.
Only the cursor appears.	Call for service.
The monitor works when you turn on the server, but the screen goes blank when you start some application programs.	Make sure that: • The monitor cable is connected. • You have installed the necessary device drivers for the application programs. If the problem remains, call for service.

Symptom	Suggested action
The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted.	If the monitor self-tests show that the monitor is working correctly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescent lights, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor. **Attention:** Moving a color monitor while it is turned on might cause screen discoloration. Move the device and the monitor at least 300 mm (12 in.) apart, and turn on the monitor. **Notes:** 1. To prevent diskette drive read/write errors, make sure that the distance between the monitor and diskette drives is at least 75 mm (3 in.). 2. Non-IBM monitor cables might cause unpredictable problems. 3. An enhanced monitor cable with additional shielding is available for the 9521 and 9527 monitors. For information about the enhanced monitor cable, contact your IBM marketing representative or authorized reseller. If the problem remains, call for service.
Wrong characters appear on the screen.	If the wrong language is displayed, update the BIOS code with the correct language. If the problem remains, call for service.

Option problems

Symptom	Suggested action
An IBM option that was just installed does not work.	Make sure that: • The option is designed for the server. See the "Server Support" flowchart for information about obtaining ServerProven compatibility information from the World Wide Web. • You followed the installation instructions that come with the option. • The option is installed correctly. • You have not loosened any other installed options or cables. • You have updated the configuration information in the Configuration/Setup Utility program. Whenever memory or an option is changed, you must update the configuration. If the problem remains, call for service.
An IBM option that used to work does not work now.	• Make sure that all of the option hardware and cable connections are secure. • If the option comes with test instructions, use those instructions to test the option. • If the failing option is a SCSI device, make sure that: – The cables for all external SCSI devices are connected correctly. – The last device in each SCSI chain, or the end of the SCSI cable, is terminated correctly. – Any external SCSI devices are turned on. You must turn on external SCSI devices before turning on the server. If the problem remains, call for service.

Power problems

Symptom	Suggested action
The server does not turn on.	• Make sure that the server power cord is connected to the server and a working electrical outlet. • Make sure that the type of memory that is installed is supported by the server. • If you just installed an option, remove it, and restart the server. If the server now turns on, you might have installed more options than the power supply supports. If the problem remains, call for service.
The server does not turn off.	Determine whether you are using an ACPI or non-ACPI operating system. If you are using a non-ACPI operating system, complete the following steps: 1. Press Ctrl+Alt+Delete. 2. Turn off the server by using the power-control button. You might have to press and hold the power-control button for 5 seconds to force the server to turn off. If the problem remains or if you are using an ACPI operating system, call for service.

Serial connector problems

For more information about the serial connector, see the *Option Installation Guide* on the IBM *xSeries Documentation* CD.

Symptom	Suggested action
The number of serial connectors that are identified by the operating system is less than the number of installed serial connectors.	Make sure that: • Each connector is assigned a unique address in the Configuration/Setup Utility program and none of the serial connectors is disabled. • The serial connector adapter, if you installed one, is seated correctly. If the problem remains, call for service.
A serial device does not work.	Make sure that: • The device is compatible with the server. • The serial connector is enabled and is assigned a unique address. • The device is connected to the serial connector and the serial connector is connected to the serial connector (J8) on the system board. If the problem remains, call for service.

Software problems

Symptom	Suggested action
You suspect a software problem.	To determine whether the problem is caused by the software, make sure that: • The server has the minimum memory needed to use the software. For memory requirements, see the information that comes with the software. If you have just installed an adapter or memory, the server might have a memory-address conflict. • The software is designed to operate on the server. • Other software works on the server. • The software works on another server. If you received any error messages when using the software, see the information that comes with the software for a description of the messages and suggested solutions to the problem. If the problem remains, contact your place of purchase of the software.

Universal Serial Bus device problems

Symptom	Suggested action
A USB device does not work.	Make sure that: • You are not trying to use a USB device during POST if a standard (non-USB) keyboard is connected to the keyboard connector. If a standard (non-USB) keyboard is connected to the keyboard connector, the USB is disabled, and no USB device will work during POST. • The correct USB device driver is installed. • The operating system supports USB devices. If the problem remains, call for service.

Light path diagnostics

The following illustration shows the remind button and the LEDs on the light path diagnostics panel. The light path diagnostics panel is inside the server under the left-side cover and the error LEDs are also visible through the left-side cover.
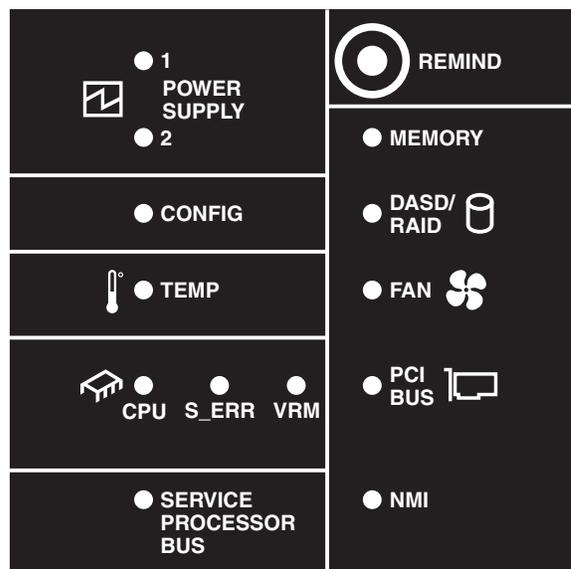
Use the remind button on the light path diagnostic panel to acknowledge that an error has occurred without taking further action. When you push the remind button the system error LED will flash every 2 seconds until the error is fixed. If another error occurs the system error LED will then stop flashing and return to a solid on state.

For more information about light path diagnostics, see the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD.

Diagnosing problems using the light path diagnostics

LEDs in three locations on the server are available to help you diagnose problems that might occur during installation. Use them in the following order:

1. **Operator information panel** - Look at this panel first. If a system error has occurred, the system-error LED on the front of the server is lit.

2. **LEDs on the left-side cover** - There are 13 LEDs and a system service label on the left-side cover. Note the lit LEDs and follow the instructions on the system service label.

3. **LEDs on the system board** - To identify the component that is causing the error, note the lit LED next to the component.

Light path diagnostics LEDs

The following table lists the LEDs on the light path diagnostics panel, the problems that they indicate, and actions to solve the problems.

LED	Problem	Action
POWER SUPPLY 1	Lit LED: Power supply 1 has failed.	1. Remove ac power from the server. 2. Replace the power supply; then, reconnect the server to ac power and restart the server.
	Flashing LED: Power supply 1 was removed in a redundant power-supply configuration.	Install a new power supply in the PS1 location.
POWER SUPPLY 2	Lit LED: Power supply 2 has failed.	1. Remove ac power from the server. 2. Replace the power supply; then, reconnect the server to ac power and restart the server.
	Flashing LED: Power supply 2 was removed in a redundant power supply configuration.	Install a new power supply in the PS2 location.
MEMORY	A memory error has occurred.	Replace the failing DIMM, indicated by the lit LED on the system board.
CONFIG	A configuration error has occurred.	Locate the second flashing LED and fix the configuration problem associated with the blinking LED.
DASD/RAID	A hard disk drive, integrated SCSI controller, or integrated RAID error has occurred.This LED will also be lit when a hard disk drive is removed from the server.	• Check the LEDs on the hard disk drives and replace the indicated drive. • Check the LEDs on the system board and replace the indicated component. • If a hard disk drive LED remains lit after being replaced, call for service.
TEMP	The system temperature has exceeded a threshold level.	• Determine whether a fan has failed. If it has, replace it. • Make sure that the room temperature is not too high. See "Features and specifications" on page 5 for temperature information. • Make sure that the air vents are not blocked. If the problem remains, call for service.
FAN	A fan has failed or is operating too slowly. A failing fan can also cause the TEMP LED to be lit.	Replace the failing fan, indicated by the lit LED.
CPU	A microprocessor has failed.	If a lit LED on the system board indicates a problem with a microprocessor, make sure that the microprocessor is installed correctly. See the *Option Installation Guide* on the IBM *xSeries Documentation* CD for information about installing a microprocessor. If the problem remains, call for service.
S_ERR	A soft error has occurred.	1. Restart the server. 2. Update the firmware and adapter drivers. 3. Check the POST error log If the problem remains, call for service.

LED	Problem	Action
VRM	The VRM or integrated VRD has failed.	• Remove ac power from the server, and then restart the server. • If the LED next to the VRM is lit, replace the pluggable VRM. • If the LED next to the integrated VRD is lit, call for service.
PCI BUS	An error has occurred on a PCI bus.	• Check the system error log for information about the error. • If you cannot isolate the failing adapter through the information in the system error log, remove one adapter at a time from the failing PCI bus, and restart the server after each adapter is removed. If the problem remains, call for service.
SERVICE PROCESSOR BUS	The service processor has failed.	Remove ac power from the server; then, reconnect the server to ac power and restart the server. If the problem remains, call for service.
NMI	A machine check error has occurred.	Check the error log to diagnose the condition.

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This appendix contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your xSeries or IntelliStation® system, and whom to call for service, if it is necessary.

Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system is turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD or in the IntelliStation *Hardware Maintenance Manual* at the IBM Support Web site.
- Go to the IBM Support Web site at http://www.ibm.com/pc/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the publications that are provided with your system and software. The information that comes with your system also describes the diagnostic tests that you can perform. Most xSeries and IntelliStation systems, operating systems, and programs come with information that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the information for the operating system or program.

Using the documentation

Information about your IBM xSeries or IntelliStation system and preinstalled software, if any, is available in the documentation that comes with your system. That documentation includes printed books, online books, readme files, and help files. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to http://www.ibm.com/pc/support/ and follow the instructions. Also, you can order publications through the IBM Publications Ordering System at
http://www.elink.ibmlink.ibm.com/public/applications/publications/cgibin/pbi.cgi.

Getting help and information from the World Wide Web

On the World Wide Web, the IBM Web site has up-to-date information about IBM xSeries and IntelliStation products, services, and support. The address for IBM xSeries information is http://www.ibm.com/eserver/xseries/. The address for IBM IntelliStation information is http://www.ibm.com/pc/intellistation/.

You can find service information for your IBM products, including supported options, at http://www.ibm.com/pc/support/.

Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with xSeries servers, IntelliStation workstations, and appliances. For information about which products are supported by Support Line in your country or region, go to http://www.ibm.com/services/sl/products/.

For more information about Support Line and other IBM services, go to http://www.ibm.com/services/, or go to http://www.ibm.com/planetwide/ for support telephone numbers. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

Hardware service and support

You can receive hardware service through IBM Services or through your IBM reseller, if your reseller is authorized by IBM to provide warranty service. Go to http://www.ibm.com/planetwide/ for support telephone numbers, or in the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

In the U.S. and Canada, hardware service and support is available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9 a.m. to 6 p.m.

Appendix B. IBM Statement of Limited Warranty Z125-4753-08 04/2004

Part 1 - General Terms

Part 1 - General Terms

*This Statement of Limited Warranty includes Part 1 - General Terms, Part 2 - Country-unique Terms, and Part 3 - Warranty Information. The terms of Part 2 replace or modify those of Part 1. The warranties provided by IBM in this Statement of Limited Warranty apply only to Machines you purchase for your use, and not for resale. The term "Machine" means an IBM machine, its features, conversions, upgrades, elements, or accessories, or any combination of them. The term "Machine" does not include any software programs, whether pre-loaded with the Machine, installed subsequently or otherwise. **Nothing in this Statement of Limited Warranty affects any statutory rights of consumers that cannot be waived or limited by contract.***

What this Warranty Covers

IBM warrants that each Machine 1) is free from defects in materials and workmanship and 2) conforms to IBM's Official Published Specifications ("Specifications") which are available on request. The warranty period for the Machine starts on the original Date of Installation and is specified in Part 3 - Warranty Information. The date on your invoice or sales receipt is the Date of Installation unless IBM or your reseller informs you otherwise. Many features, conversions, or upgrades involve the removal of parts and their return to IBM. A part that replaces a removed part will assume the warranty service status of the removed part. Unless IBM specifies otherwise, these warranties apply only in the country or region in which you purchased the Machine.

THESE WARRANTIES ARE YOUR EXCLUSIVE WARRANTIES AND REPLACE ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. SOME STATES OR JURISDICTIONS DO NOT ALLOW THE EXCLUSION OF EXPRESS OR IMPLIED WARRANTIES, SO THE ABOVE EXCLUSION MAY NOT APPLY TO YOU. IN THAT EVENT, SUCH WARRANTIES ARE LIMITED IN DURATION TO THE WARRANTY PERIOD. NO WARRANTIES APPLY AFTER THAT PERIOD. SOME STATES OR JURISDICTIONS DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

What this Warranty Does not Cover

This warranty does not cover the following:
* any software programs, whether pre-loaded or shipped with the Machine, or installed subsequently;
* failure resulting from misuse (including but not limited to use of any Machine capacity or capability, other than that authorized by IBM in writing), accident, modification, unsuitable physical or operating environment, or improper maintenance by you;
* failure caused by a product for which IBM is not responsible; and
* any non-IBM products, including those that IBM may procure and provide with or integrate into an IBM Machine at your request.

The warranty is voided by removal or alteration of identification labels on the Machine or its parts.

IBM does not warrant uninterrupted or error-free operation of a Machine.

Any technical or other support provided for a Machine under warranty, such as assistance with "how-to" questions and those regarding Machine set-up and installation, is provided **WITHOUT WARRANTIES OF ANY KIND**.

How to Obtain Warranty Service

If the Machine does not function as warranted during the warranty period, contact IBM or your reseller to obtain warranty service. If you do not register the Machine with IBM, you may be required to present proof of purchase as evidence of your entitlement to warranty service.

What IBM Will Do to Correct Problems

When you contact IBM for service, you must follow the problem determination and resolution procedures that IBM specifies. An initial diagnosis of your problem can be made either by a technician over the telephone or electronically by access to an IBM website.

The type of warranty service applicable to your Machine is specified in Part 3 - Warranty Information.

You are responsible for downloading and installing designated Machine Code (microcode, basic input/output system code (called "BIOS"), utility programs, device drivers, and diagnostics delivered with an IBM Machine) and other software updates from an IBM Internet Web site or from other electronic media, and following the instructions that IBM provides.

If your problem can be resolved with a Customer Replaceable Unit ("CRU") (e.g., keyboard, mouse, speaker, memory, hard disk drive), IBM will ship the CRU to you for you to install.

If the Machine does not function as warranted during the warranty period and your problem cannot be resolved over the telephone or electronically, through your application of Machine Code or software updates, or with a CRU, IBM or your reseller, if approved by IBM to provide warranty service, will either, at its discretion, 1) repair it to make it function as warranted, or 2) replace it with one that is at least functionally equivalent. If IBM is unable to do either, you may return the Machine to your place of purchase and your money will be refunded.

IBM or your reseller will also manage and install selected engineering changes that apply to the Machine.

Exchange of a Machine or Part

When the warranty service involves the exchange of a Machine or part, the item IBM or your reseller replaces becomes its property and the replacement becomes yours. You represent that all removed items are genuine and unaltered. The replacement may not be new, but will be in good working order and at least functionally equivalent to the item replaced. The replacement assumes the warranty service status of the replaced item.

Your Additional Responsibilities

Before IBM or your reseller exchanges a Machine or part, you agree to remove all features, parts, options, alterations, and attachments not under warranty service.

You also agree to:
1. ensure that the Machine is free of any legal obligations or restrictions that prevent its exchange;
2. obtain authorization from the owner to have IBM or your reseller service a Machine that you do not own; and
3. where applicable, before service is provided:
   a. follow the service request procedures that IBM or your reseller provides;
   b. backup or secure all programs, data, and funds contained in the Machine;
   c. provide IBM or your reseller with sufficient, free, and safe access to your facilities to permit IBM to fulfill its obligations; and
   d. inform IBM or your reseller of changes in the Machine's location.
4. (a) ensure all information about identified or identifiable individuals (Personal Data) is deleted from the Machine (to the extent technically possible), (b) allow IBM, your reseller or an IBM supplier to process on your behalf any remaining Personal Data as IBM or your reseller considers necessary to fulfill its obligations under this Statement of Limited Warranty (which may include shipping the Machine for such processing to other IBM service locations around the world), and (c) ensure that such processing complies with any laws applicable to such Personal Data.

Limitation of Liability

IBM is responsible for loss of, or damage to, your Machine only while it is 1) in IBM's possession or 2) in transit in those cases where IBM is responsible for the transportation charges.

Neither IBM nor your reseller are responsible for any of your confidential, proprietary or personal information contained in a Machine which you return to IBM for any reason. You should remove all such information from the Machine prior to its return.

Circumstances may arise where, because of a default on IBM's part or other liability, you are entitled to recover damages from IBM. In each such instance, regardless of the basis on which you are entitled to claim damages from IBM (including fundamental breach, negligence, misrepresentation, or other contract or tort claim), except for any liability that cannot be waived or limited by applicable laws, IBM is liable for no more than
1. damages for bodily injury (including death) and damage to real property and tangible personal property; and
2. the amount of any other actual direct damages, up to the charges (if recurring, 12 months' charges apply) for the Machine that is subject of the claim. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code ("LIC").

This limit also applies to IBM's suppliers and your reseller. It is the maximum for which IBM, its suppliers, and your reseller are collectively responsible.

UNDER NO CIRCUMSTANCES IS IBM, ITS SUPPLIERS OR RESELLERS LIABLE FOR ANY OF THE FOLLOWING EVEN IF INFORMED OF THEIR POSSIBILITY: 1) THIRD PARTY CLAIMS AGAINST YOU FOR DAMAGES (OTHER THAN THOSE UNDER THE FIRST ITEM LISTED ABOVE); 2) LOSS OF,

OR DAMAGE TO, DATA; 3) SPECIAL, INCIDENTAL, OR INDIRECT DAMAGES OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES; OR 4) LOST PROFITS, BUSINESS REVENUE, GOODWILL OR ANTICIPATED SAVINGS. SOME STATES OR JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU. SOME STATES OR JURISDICTIONS DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

Governing Law

Both you and IBM consent to the application of the laws of the country in which you acquired the Machine to govern, interpret, and enforce all of your and IBM's rights, duties, and obligations arising from, or relating in any manner to, the subject matter of this Statement of Limited Warranty, without regard to conflict of law principles.

THESE WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE OR JURISDICTION TO JURISDICTION.

Jurisdiction

All of our rights, duties, and obligations are subject to the courts of the country in which you acquired the Machine.

Part 2 - Country-unique Terms

AMERICAS

ARGENTINA

Jurisdiction: *The following is added after the first sentence:*

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the Ordinary Commercial Court of the city of Buenos Aires.

BOLIVIA

Jurisdiction: *The following is added after the first sentence:*

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the courts of the city of La Paz.

BRAZIL

Jurisdiction: *The following is added after the first sentence:*
Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the court of Rio de Janeiro, RJ.

CHILE

Jurisdiction: *The following is added after the first sentence:*

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the Civil Courts of Justice of Santiago.

COLOMBIA

Jurisdiction: *The following is added after the first sentence:*

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the Judges of the Republic of Colombia.

EQUADOR

Jurisdiction: *The following is added after the first sentence:*

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the Judges of Quito.

MEXICO

Jurisdiction: *The following is added after the first sentence:*

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the Federal Courts of Mexico City, Federal District.

PARAGUAY

Jurisdiction: *The following is added after the first sentence:*

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the courts of the city of Asuncion.

PERU

Limitation of Liability: *The following is added at the end of this section:*

In accordance with Article 1328 of the Peruvian Civil Code the limitations and exclusions specified in this section will not apply to damages caused by IBM's willful misconduct ("dolo") or gross negligence ("culpa inexcusable").

URUGUAY

Jurisdiction: *The following is added after the first sentence:*

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the City of Montevideo Court's Jurisdiction.

VENEZUELA

Jurisdiction: *The following is added after the first sentence:*

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the Courts of the Metropolitan Area Of the City of Caracas.

NORTH AMERICA

How to Obtain Warranty Service: *The following is added to this Section:*
To obtain warranty service from IBM in Canada or the United States, call
1-800-IBM-SERV (426-7378).

CANADA

Limitation of Liability: *The following replaces item 1 of this section:*

1. damages for bodily injury (including death) or physical harm to real property and tangible personal property caused by IBM's negligence; and

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*
laws in the Province of Ontario.

UNITED STATES

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*
laws of the State of New York.

ASIA PACIFIC

AUSTRALIA

What this Warranty Covers: *The following paragraph is added to this section:*
The warranties specified in this Section are in addition to any rights you may have under the Trade Practices Act 1974 or other similar legislation and are only limited to the extent permitted by the applicable legislation.

Limitation of Liability: *The following is added to this section:*
Where IBM is in breach of a condition or warranty implied by the Trade Practices Act 1974 or other similar legislation, IBM's liability is limited to the repair or replacement of the goods or the supply of equivalent goods. Where that condition or warranty relates to right to sell, quiet possession or clear title, or the goods are of a kind ordinarily acquired for personal, domestic or household use or consumption, then none of the limitations in this paragraph apply.

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*
laws of the State or Territory.

CAMBODIA AND LAOS

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*
laws of the State of New York, United States of America.

CAMBODIA, INDONESIA, AND LAOS

Arbitration: *The following is added under this heading:*
Disputes arising out of or in connection with this Statement of Limited Warranty shall be finally settled by arbitration which shall be held in Singapore in accordance with the Arbitration Rules of Singapore International Arbitration Center ("SIAC Rules") then in effect. The arbitration award shall be final and binding for the parties without appeal and shall be in writing and set forth the findings of fact and the conclusions of law.

The number of arbitrators shall be three, with each side to the dispute being entitled to appoint one arbitrator. The two arbitrators appointed by the parties shall appoint a third arbitrator who shall act as chairman of the proceedings. Vacancies in the

post of chairman shall be filled by the president of the SIAC. Other vacancies shall be filled by the respective nominating party. Proceedings shall continue from the stage they were at when the vacancy occurred.

If one of the parties refuses or otherwise fails to appoint an arbitrator within 30 days of the date the other party appoints its, the first appointed arbitrator shall be the sole arbitrator, provided that the arbitrator was validly and properly appointed.

All proceedings shall be conducted, including all documents presented in such proceedings, in the English language. The English language version of this Statement of Limited Warranty prevails over any other language version.

HONG KONG S.A.R. OF CHINA AND MACAU S.A.R. OF CHINA

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*
laws of Hong Kong Special Administrative Region of China.

INDIA

Limitation of Liability: *The following replaces items 1 and 2 of this section:*
1. liability for bodily injury (including death) or damage to real property and tangible personal property will be limited to that caused by IBM's negligence; and
2. as to any other actual damage arising in any situation involving nonperformance by IBM pursuant to, or in any way related to the subject of this Statement of Limited Warranty, the charge paid by you for the individual Machine that is the subject of the claim. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code ("LIC").

Arbitration: *The following is added under this heading:*

Disputes arising out of or in connection with this Statement of Limited Warranty shall be finally settled by arbitration which shall be held in Bangalore, India in accordance with the laws of India then in effect. The arbitration award shall be final and binding for the parties without appeal and shall be in writing and set forth the findings of fact and the conclusions of law.

The number of arbitrators shall be three, with each side to the dispute being entitled to appoint one arbitrator. The two arbitrators appointed by the parties shall appoint a third arbitrator who shall act as chairman of the proceedings. Vacancies in the post of chairman shall be filled by the president of the Bar Council of India. Other vacancies shall be filled by the respective nominating party. Proceedings shall continue from the stage they were at when the vacancy occurred.

If one of the parties refuses or otherwise fails to appoint an arbitrator within 30 days of the date the other party appoints its, the first appointed arbitrator shall be the sole arbitrator, provided that the arbitrator was validly and properly appointed.

All proceedings shall be conducted, including all documents presented in such proceedings, in the English language. The English language version of this Statement of Limited Warranty prevails over any other language version.

JAPAN

Governing Law: *The following sentence is added to this section:*
Any doubts concerning this Statement of Limited Warranty will be initially resolved between us in good faith and in accordance with the principle of mutual trust.

MALAYSIA

Limitation of Liability: *The word "**SPECIAL**" in item 3 of the fifth paragraph is deleted.*

NEW ZEALAND

What this Warranty Covers: *The following paragraph is added to this section:*
The warranties specified in this section are in addition to any rights you may have under the Consumer Guarantees Act 1993 or other legislation which cannot be excluded or limited. The Consumer Guarantees Act 1993 will not apply in respect of any goods which IBM provides, if you require the goods for the purposes of a business as defined in that Act.

Limitation of Liability: *The following is added to this section:*
Where Machines are not acquired for the purposes of a business as defined in the Consumer Guarantees Act 1993, the limitations in this section are subject to the limitations in that Act.

PEOPLE'S REPUBLIC OF CHINA (PRC)

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*

laws of the State of New York, United States of America (except when local law requires otherwise).

PHILIPPINES

Limitation of Liability: *Item 3 in the fifth paragraph is replaced by the following:*

SPECIAL (INCLUDING NOMINAL AND EXEMPLARY DAMAGES), MORAL, INCIDENTAL, OR INDIRECT DAMAGES FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES; OR

Arbitration: *The following is added under this heading:*

Disputes arising out of or in connection with this Statement of Limited Warranty shall be finally settled by arbitration which shall be held in Metro Manila, Philippines in accordance with the laws of the Philippines then in effect. The arbitration award shall be final and binding for the parties without appeal and shall be in writing and set forth the findings of fact and the conclusions of law.

The number of arbitrators shall be three, with each side to the dispute being entitled to appoint one arbitrator. The two arbitrators appointed by the parties shall appoint a third arbitrator who shall act as chairman of the proceedings. Vacancies in the post of chairman shall be filled by the president of the Philippine Dispute Resolution Center, Inc. Other vacancies shall be filled by the respective nominating party. Proceedings shall continue from the stage they were at when the vacancy occurred.

If one of the parties refuses or otherwise fails to appoint an arbitrator within 30 days of the date the other party appoints its, the first appointed arbitrator shall be the sole arbitrator, provided that the arbitrator was validly and properly appointed.

All proceedings shall be conducted, including all documents presented in such proceedings, in the English language. The English language version of this Statement of Limited Warranty prevails over any other language version.

SINGAPORE

Limitation of Liability: *The words* "**SPECIAL**" *and* "**ECONOMIC**" *in item 3 in the fifth paragraph are deleted.*

EUROPE, MIDDLE EAST, AFRICA (EMEA)

THE FOLLOWING TERMS APPLY TO ALL EMEA COUNTRIES:
The terms of this Statement of Limited Warranty apply to Machines purchased from IBM or an IBM reseller.

How to Obtain Warranty Service:

Add the following paragraph in **Western Europe** *(Andorra, Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Netherlands, Norway, Poland, Portugal, San Marino, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom, Vatican State, and any country subsequently added to the European Union, as from the date of accession):*

The warranty for Machines acquired in Western Europe shall be valid and applicable in all Western Europe countries provided the Machines have been announced and made available in such countries.

If you purchase a Machine in one of the Western European countries, as defined above, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM, provided the Machine has been announced and made available by IBM in the country in which you wish to obtain service.

If you purchased a Personal Computer Machine in Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Federal Republic of Yugoslavia, Former Yugoslav Republic of Macedonia (FYROM), Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, or Ukraine, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM.

If you purchase a Machine in a Middle Eastern or African country, you may obtain warranty service for that Machine from the IBM entity within the country of purchase, if that IBM entity provides warranty service in that country, or from an IBM reseller, approved by IBM to perform warranty service on that Machine in that country. Warranty service in Africa is available within 50 kilometers of an IBM approved service provider. You are responsible for transportation costs for Machines located outside 50 kilometers of an IBM approved service provider.

Governing Law:

The phrase "the laws of the country in which you acquired the Machine" is replaced by:

1) "the laws of Austria" **in Albania, Armenia, Azerbaijan, Belarus, Bosnia-Herzegovina, Bulgaria, Croatia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, FYR Macedonia, Moldova, Poland, Romania, Russia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, and FR Yugoslavia;** 2) "the laws of France" **in Algeria, Benin, Burkina Faso, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo Republic, Djibouti, Democratic Republic of Congo, Equatorial Guinea, French Guiana, French Polynesia, Gabon, Gambia, Guinea, Guinea-Bissau, Ivory Coast, Lebanon, Madagascar, Mali, Mauritania, Mauritius, Mayotte, Morocco, New Caledonia, Niger, Reunion, Senegal, Seychelles, Togo, Tunisia, Vanuatu, and Wallis & Futuna;** 3) "the laws of Finland" **in Estonia, Latvia, and Lithuania;** 4) "the laws of England" **in Angola, Bahrain, Botswana, Burundi, Egypt, Eritrea, Ethiopia, Ghana, Jordan, Kenya, Kuwait, Liberia, Malawi, Malta, Mozambique, Nigeria, Oman, Pakistan, Qatar, Rwanda, Sao Tome, Saudi Arabia, Sierra Leone, Somalia, Tanzania, Uganda, United Arab Emirates, the United Kingdom, West Bank/Gaza, Yemen, Zambia, and Zimbabwe;** and 5) "the laws of South Africa" **in South Africa, Namibia, Lesotho and Swaziland.**

Jurisdiction: *The following exceptions are added to this section:*

1) **In Austria** the choice of jurisdiction for all disputes arising out of this Statement of Limited Warranty and relating thereto, including its existence, will be the competent court of law in Vienna, Austria (Inner-City); 2) **in Angola, Bahrain, Botswana, Burundi, Egypt, Eritrea, Ethiopia, Ghana, Jordan, Kenya, Kuwait, Liberia, Malawi, Malta, Mozambique, Nigeria, Oman, Pakistan, Qatar, Rwanda, Sao Tome, Saudi Arabia, Sierra Leone, Somalia, Tanzania, Uganda, United Arab Emirates, West Bank/Gaza, Yemen, Zambia, and Zimbabwe** all disputes arising out of this Statement of Limited Warranty or related to its execution, including summary proceedings, will be submitted to the exclusive jurisdiction of the English courts; 3) in **Belgium** and **Luxembourg**, all disputes arising out of this Statement of Limited Warranty or related to its interpretation or its execution, the law, and the courts of the capital city, of the country of your registered office and/or commercial site location only are competent; 4) **in France, Algeria, Benin, Burkina Faso, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo Republic, Djibouti, Democratic Republic of Congo, Equatorial Guinea, French Guiana, French Polynesia, Gabon, Gambia, Guinea, Guinea-Bissau, Ivory Coast, Lebanon, Madagascar, Mali, Mauritania, Mauritius, Mayotte, Morocco, New Caledonia, Niger, Reunion, Senegal, Seychelles, Togo, Tunisia, Vanuatu, and Wallis & Futuna** all disputes arising out of this Statement of Limited Warranty or related to its violation or execution, including summary proceedings, will be settled exclusively by the Commercial Court of Paris; 5) **in Russia**, all disputes arising out of or in relation to the interpretation, the violation, the termination, the nullity of the execution of this Statement of Limited Warranty shall be settled by Arbitration Court of Moscow; 6) **in South Africa, Namibia, Lesotho and Swaziland**, both of us agree to submit all disputes relating to this Statement of Limited Warranty to the jurisdiction of the High Court in Johannesburg; 7) **in Turkey** all disputes arising out of or in connection with this Statement of Limited Warranty shall be resolved by the Istanbul Central (Sultanahmet) Courts and Execution Directorates of Istanbul, the Republic of Turkey; 8) in each of the following specified countries, any legal claim arising out of this Statement of Limited Warranty will be brought before, and settled exclusively by, the competent court of a) Athens for **Greece**, b) Tel Aviv-Jaffa for **Israel**, c) Milan for **Italy**, d) Lisbon for **Portugal**, and e)

Madrid for **Spain**; and 9) **in the United Kingdom**, both of us agree to submit all disputes relating to this Statement of Limited Warranty to the jurisdiction of the English courts.

Arbitration: *The following is added under this heading:*

In Albania, Armenia, Azerbaijan, Belarus, Bosnia-Herzegovina, Bulgaria, Croatia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, FYR Macedonia, Moldova, Poland, Romania, Russia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, and FR Yugoslavia all disputes arising out of this Statement of Limited Warranty or related to its violation, termination or nullity will be finally settled under the Rules of Arbitration and Conciliation of the International Arbitral Center of the Federal Economic Chamber in Vienna (Vienna Rules) by three arbitrators appointed in accordance with these rules. The arbitration will be held in Vienna, Austria, and the official language of the proceedings will be English. The decision of the arbitrators will be final and binding upon both parties. Therefore, pursuant to paragraph 598 (2) of the Austrian Code of Civil Procedure, the parties expressly waive the application of paragraph 595 (1) figure 7 of the Code. IBM may, however, institute proceedings in a competent court in the country of installation.

In Estonia, Latvia and Lithuania all disputes arising in connection with this Statement of Limited Warranty will be finally settled in arbitration that will be held in Helsinki, Finland in accordance with the arbitration laws of Finland then in effect. Each party will appoint one arbitrator. The arbitrators will then jointly appoint the chairman. If arbitrators cannot agree on the chairman, then the Central Chamber of Commerce in Helsinki will appoint the chairman.

EUROPEAN UNION (EU)

THE FOLLOWING TERMS APPLY TO ALL EU COUNTRIES:

The warranty for Machines acquired in EU countries is valid and applicable in all EU countries provided the Machines have been announced and made available in such countries.

How to Obtain Warranty Service: *The following is added to this section:*

To obtain warranty service from IBM in EU countries, see the telephone listing in Part 3 - Warranty Information.

You may contact IBM at the following address:
    IBM Warranty & Service Quality Dept.
    PO Box 30
    Spango Valley
    Greenock
    Scotland PA16 0AH

CONSUMERS

Consumers have legal rights under applicable national legislation governing the sale of consumer goods. Such rights are not affected by the warranties provided in this Statement of Limited Warranty.

AUSTRIA, DENMARK, FINLAND, GREECE, ITALY, NETHERLANDS, NORWAY, PORTUGAL, SPAIN, SWEDEN AND SWITZERLAND

Limitation of Liability: *The following replaces the terms of this section in its entirety:*

Except as otherwise provided by mandatory law:
1. IBM's liability for any damages and losses that may arise as a consequence of the fulfillment of its obligations under or in connection with this Statement of Limited Warranty or due to any other cause related to this Statement of Limited Warranty is limited to the compensation of only those damages and losses proved and actually arising as an immediate and direct consequence of the non-fulfillment of such obligations (if IBM is at fault) or of such cause, for a maximum amount equal to the charges you paid for the Machine. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code ("LIC").

   The above limitation shall not apply to damages for bodily injuries (including death) and damages to real property and tangible personal property for which IBM is legally liable.
2. **UNDER NO CIRCUMSTANCES IS IBM, ITS SUPPLIERS OR RESELLERS LIABLE FOR ANY OF THE FOLLOWING, EVEN IF INFORMED OF THEIR POSSIBILITY: 1) LOSS OF, OR DAMAGE TO, DATA; 2) INCIDENTAL OR INDIRECT DAMAGES, OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES; 3) LOST PROFITS, EVEN IF THEY ARISE AS AN IMMEDIATE CONSEQUENCE OF THE EVENT THAT GENERATED THE DAMAGES; OR 4) LOSS OF BUSINESS, REVENUE, GOODWILL, OR ANTICIPATED SAVINGS.**

FRANCE AND BELGIUM

Limitation of Liability: *The following replaces the terms of this section in its entirety:*

Except as otherwise provided by mandatory law:
1. IBM's liability for any damages and losses that may arise as a consequence of the fulfillment of its obligations under or in connection with this Statement of Limited Warranty is limited to the compensation of only those damages and losses proved and actually arising as an immediate and direct consequence of the non-fulfillment of such obligations (if IBM is at fault), for a maximum amount equal to the charges you paid for the Machine that has caused the damages. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code ("LIC").

   The above limitation shall not apply to damages for bodily injuries (including death) and damages to real property and tangible personal property for which IBM is legally liable.
2. **UNDER NO CIRCUMSTANCES IS IBM, ITS SUPPLIERS OR RESELLERS LIABLE FOR ANY OF THE FOLLOWING, EVEN IF INFORMED OF THEIR POSSIBILITY: 1) LOSS OF, OR DAMAGE TO, DATA; 2) INCIDENTAL OR INDIRECT DAMAGES, OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES; 3) LOST PROFITS, EVEN IF THEY ARISE AS AN IMMEDIATE CONSEQUENCE OF THE EVENT THAT GENERATED THE DAMAGES; OR 4) LOSS OF BUSINESS, REVENUE, GOODWILL, OR ANTICIPATED SAVINGS.**

THE FOLLOWING TERMS APPLY TO THE COUNTRY SPECIFIED:

AUSTRIA

The provisions of this Statement of Limited Warranty replace any applicable statutory warranties.

What this Warranty Covers: *The following replaces the first sentence of the first paragraph of this section:*
The warranty for an IBM Machine covers the functionality of the Machine for its normal use and the Machine's conformity to its Specifications.

The following paragraphs are added to this section:

The limitation period for consumers in action for breach of warranty is the statutory period as a minimum. In case IBM or your reseller is unable to repair an IBM Machine, you can alternatively ask for a partial refund as far as justified by the reduced value of the unrepaired Machine or ask for a cancellation of the respective agreement for such Machine and get your money refunded.

The second paragraph does not apply.

What IBM Will Do to Correct Problems: *The following is added to this section:*

During the warranty period, IBM will reimburse you for the transportation charges for the delivery of the failing Machine to IBM.

Limitation of Liability: *The following paragraph is added to this section:*

The limitations and exclusions specified in the Statement of Limited Warranty will not apply to damages caused by IBM with fraud or gross negligence and for express warranty.

The following sentence is added to the end of item 2:

IBM's liability under this item is limited to the violation of essential contractual terms in cases of ordinary negligence.

EGYPT

Limitation of Liability: *The following replaces item 2 in this section:*
as to any other actual direct damages, IBM's liability will be limited to the total amount you paid for the Machine that is the subject of the claim. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code ("LIC").

Applicability of suppliers and resellers (unchanged).

FRANCE

Limitation of Liability: *The following replaces the second sentence of the first paragraph of this section:*
In such instances, regardless of the basis on which you are entitled to claim damages from IBM, IBM is liable for no more than: (items 1 and 2 unchanged).

GERMANY

What this Warranty Covers: *The following replaces the first sentence of the first paragraph of this section:*

The warranty for an IBM Machine covers the functionality of the Machine for its normal use and the Machine's conformity to its Specifications.

The following paragraphs are added to this section:

The minimum warranty period for Machines is twelve months. In case IBM or your reseller is unable to repair an IBM Machine, you can alternatively ask for a partial refund as far as justified by the reduced value of the unrepaired Machine or ask for a cancellation of the respective agreement for such Machine and get your money refunded.

The second paragraph does not apply.

What IBM Will Do to Correct Problems: *The following is added to this section:*

During the warranty period, transportation for delivery of the failing Machine to IBM will be at IBM's expense.

Limitation of Liability: *The following paragraph is added to this section:*

The limitations and exclusions specified in the Statement of Limited Warranty will not apply to damages caused by IBM with fraud or gross negligence and for express warranty.

The following sentence is added to the end of item 2:

IBM's liability under this item is limited to the violation of essential contractual terms in cases of ordinary negligence.

HUNGARY

Limitation of Liability: *The following is added at the end of this section:*

The limitation and exclusion specified herein shall not apply to liability for a breach of contract damaging life, physical well-being, or health that has been caused intentionally, by gross negligence, or by a criminal act.

The parties accept the limitations of liability as valid provisions and state that the Section 314.(2) of the Hungarian Civil Code applies as the acquisition price as well as other advantages arising out of the present Statement of Limited Warranty balance this limitation of liability.

IRELAND

What this Warranty Covers: *The following is added to this section:*
Except as expressly provided in these terms and conditions, all statutory conditions, including all warranties implied, but without prejudice to the generality of the foregoing all warranties implied by the Sale of Goods Act 1893 or the Sale of Goods and Supply of Services Act 1980 are hereby excluded.

Limitation of Liability: *The following replaces the terms of this section in its entirety:*

For the purposes of this section, a "Default" means any act, statement, omission, or negligence on the part of IBM in connection with, or in relation to, the subject matter of this Statement of Limited Warranty in respect of which IBM is legally liable to

you, whether in contract or tort. A number of Defaults which together result in, or contribute to, substantially the same loss or damage will be treated as one Default occurring on the date of occurrence of the last such Default.

Circumstances may arise where, because of a Default, you are entitled to recover damages from IBM.

This section sets out the extent of IBM's liability and your sole remedy.
1. IBM will accept unlimited liability for death or personal injury caused by the negligence of IBM.
2. Subject always to the **Items for Which IBM is Not Liable** below, IBM will accept unlimited liability for physical damage to your tangible property resulting from the negligence of IBM.
3. Except as provided in items 1 and 2 above, IBM's entire liability for actual damages for any one Default will not in any event exceed the greater of 1) EUR 125,000, or 2) 125% of the amount you paid for the Machine directly relating to the Default.

Items for Which IBM is Not Liable

Save with respect to any liability referred to in item 1 above, under no circumstances is IBM, its suppliers or resellers liable for any of the following, even if IBM or they were informed of the possibility of such losses:
1. loss of, or damage to, data;
2. special, indirect, or consequential loss; or
3. loss of profits, business, revenue, goodwill, or anticipated savings.

SLOVAKIA

Limitation of Liability: *The following is added to the end of the last paragraph:*

The limitations apply to the extent they are not prohibited under §§ 373-386 of the Slovak Commercial Code.

SOUTH AFRICA, NAMIBIA, BOTSWANA, LESOTHO AND SWAZILAND

Limitation of Liability: *The following is added to this section:*

IBM's entire liability to you for actual damages arising in all situations involving nonperformance by IBM in respect of the subject matter of this Statement of Warranty will be limited to the charge paid by you for the individual Machine that is the subject of your claim from IBM.

UNITED KINGDOM

Limitation of Liability: *The following replaces the terms of this section in its entirety:*

For the purposes of this section, a "Default" means any act, statement, omission, or negligence on the part of IBM in connection with, or in relation to, the subject matter of this Statement of Limited Warranty in respect of which IBM is legally liable to you, whether in contract or tort. A number of Defaults which together result in, or contribute to, substantially the same loss or damage will be treated as one Default.

Circumstances may arise where, because of a Default, you are entitled to recover damages from IBM.

This section sets out the extent of IBM's liability and your sole remedy.

1. IBM will accept unlimited liability for:

    a. death or personal injury caused by the negligence of IBM; and

    b. any breach of its obligations implied by Section 12 of the Sale of Goods Act 1979 or Section 2 of the Supply of Goods and Services Act 1982, or any statutory modification or re-enactment of either such Section.

2. IBM will accept unlimited liability, subject always to the **Items for Which IBM is Not Liable** below, for physical damage to your tangible property resulting from the negligence of IBM.

3. IBM's entire liability for actual damages for any one Default will not in any event, except as provided in items 1 and 2 above, exceed the greater of 1) Pounds Sterling 75,000, or 2) 125% of the total purchase price payable or the charges for the Machine directly relating to the Default.

These limits also apply to IBM's suppliers and resellers. They state the maximum for which IBM and such suppliers and resellers are collectively responsible.

Items for Which IBM is Not Liable

Save with respect to any liability referred to in item 1 above, under no circumstances is IBM or any of its suppliers or resellers liable for any of the following, even if IBM or they were informed of the possibility of such losses:

1. loss of, or damage to, data;

2. special, indirect, or consequential loss; or

3. loss of profits, business, revenue, goodwill, or anticipated savings.

Part 3 - Warranty Information

This Part 3 provides information regarding the warranty applicable to your Machine, including the warranty period and type of warranty service IBM provides.

Warranty Period

The warranty period may vary by country or region and is specified in the table below.

Note: "Region" means either Hong Kong or Macau Special Administrative Region of China.

A warranty period of 3 years on parts and 1 year on labor means that IBM provides warranty service without charge for:

1. parts and labor during the first year of the warranty period; and

2. parts only, on an exchange basis, in the second and third years of the warranty period. IBM will charge you for any labor provided in performance of the repair or replacement(s) in the second and third year of the warranty period.

Machine type 8841

Country or Region of Purchase	Warranty Period	Type of Warranty Service*
Japan	Parts - 3 years, labor - 1 year	5
Worldwide	Parts and labor - 3 years	5
* See "Types of Warranty Service" for the legend and explanations of warranty-service types.		

Types of Warranty Service

If required, IBM provides repair or exchange service depending on the type of warranty service specified for your Machine in the above table and as described below. Warranty service may be provided by your reseller if approved by IBM to perform warranty service. Scheduling of service will depend upon the time of your call and is subject to parts availability. Service levels are response time objectives and are not guaranteed. The specified level of warranty service may not be available in all worldwide locations, additional charges may apply outside IBM's normal service area, contact your local IBM representative or your reseller for country and location specific information.

1. **Customer Replaceable Unit ("CRU") Service**

   IBM provides replacement CRUs to you for you to install. CRU information and replacement instructions are shipped with your Machine and are available from IBM at any time on your request. Installation of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation. You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service designated for your Machine. IBM specifies in the materials shipped with a replacement CRU whether a defective CRU must be returned to IBM. When return is required, 1) return instructions and a container are shipped with the replacement CRU, and 2) you may be charged for the replacement CRU if IBM does not receive the defective CRU within 30 days of your receipt of the replacement.

2. **On-site Service**

   IBM or your reseller will either repair or exchange the failing Machine at your location and verify its operation. You must provide suitable working area to allow disassembly and reassembly of the IBM Machine. The area must be clean, well lit and suitable for the purpose. For some Machines, certain repairs may require sending the Machine to an IBM service center.

3. **Courier or Depot Service***

   You will disconnect the failing Machine for collection arranged by IBM. IBM will provide you with a shipping container for you to return your Machine to a designated service center. A courier will pick up your Machine and deliver it to the designated service center. Following its repair or exchange, IBM will arrange the return delivery of the Machine to your location. You are responsible for its installation and verification.

4. **Customer Carry-In or Mail-In Service**

   You will deliver or mail as IBM specifies (prepaid unless IBM specifies otherwise) the failing Machine suitably packaged to a location IBM designates. After IBM has repaired or exchanged the Machine, IBM will make it available for your collection or, for Mail-in Service, IBM will return it to you at IBM's expense, unless IBM specifies otherwise. You are responsible for the subsequent installation and verification of the Machine.

5. **CRU and On-site Service**

   This type of Warranty Service is a combination of Type 1 and Type 2 (see above).

6. **CRU and Courier or Depot Service**

   This type of Warranty Service is a combination of Type 1 and Type 3 (see above).

7. **CRU and Customer Carry-In or Mail-In Service**

   This type of Warranty Service is a combination of Type 1 and Type 4 (see above).

When a 5, 6 or 7 type of warranty service is listed, IBM will determine which type of warranty service is appropriate for the repair.

* This type of service is called ThinkPad® EasyServ or EasyServ in some countries.

The IBM Machine Warranty World Wide Web site at http://www.ibm.com/servers/support/machine_warranties/ provides a worldwide overview of IBM's Limited Warranty for Machines, a Glossary of IBM definitions, Frequently Asked Questions (FAQs) and Support by Product (Machine) with links to Product Support pages. **The IBM Statement of Limited Warranty is also available on this site in 29 languages.**

To obtain warranty service contact IBM or your IBM reseller. In Canada or the United States, call 1-800-IBM-SERV (426-7378). In the EU countries, see the telephone numbers below.

EU Country Telephone List

Phone numbers are subject to change without notice. For the warranty service contact telephone number in a country subsequently added to the EU and not yet reflected in the list below, contact IBM in that country or visit the website above for a current telephone listing.

Austria -- +43-1-24592-5901	Latvia -- +386-61-1796-699
Belgium -- +32-70-23-3392	Lithuania -- +386-61-1796-699
Cyprus -- +357-22-841100	Luxembourg -- +352-298-977-5063
Czech Republic -- +420-2-7213-1316	Malta -- +356-23-4175
Denmark -- +45-4520-8200	Netherlands -- +31-20-514-5770
Estonia -- +386-61-1796-699	Poland -- +48-22-878-6999
Finland -- +358-8001-4260	Portugal -- +351-21-892-7147
France -- +33-238-557-450	Slovakia -- +421-2-4954-1217
Germany -- +49-1805-253553	Slovenia -- +386-1-4796-699
Greece -- +30-210-680-1700	Spain -- +34-91-714-7983
Hungary -- +36-1-382-5720	Sweden -- +46-8-477-4420
Ireland -- +353-1-815-4000	United Kingdom -- +44-1475-555-055
Italy -- +39-800-820-094	

Appendix C. Notices

This information was developed for products and services offered in the U.S.A.

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Chipkill	TechConnect
EtherJet	ThinkPad
e-business logo	Tivoli
@server	Tivoli Enterprise
FlashCopy	Update Connector
IBM	Wake on LAN
IBM (logo)	XA-32
IntelliStation	XA-64
NetBAY	X-Architecture
Netfinity	XceL4
NetView	XpandOnDemand
OS/2 WARP	xSeries

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Important notes

Processor speeds indicate the internal clock speed of the microprocessor; other factors also affect application performance.

CD-ROM drive speeds list the variable read rate. Actual speeds vary and are often less than the maximum possible.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for approximately 1000 bytes, MB stands for approximately 1 000 000 bytes, and GB stands for approximately 1 000 000 000 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity may vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard disk drive bays with the largest currently supported drives available from IBM.

Maximum memory may require replacement of the standard memory with an optional memory module.

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Some software may differ from its retail version (if available), and may not include user manuals or all program functionality.

Product recycling and disposal

This unit contains materials such as circuit boards, cables, electromagnetic compatibility gaskets, and connectors which may contain lead and copper/beryllium alloys that require special handling and disposal at end of life. Before this unit is disposed of, these materials must be removed and recycled or discarded according to applicable regulations. IBM offers product-return programs in several countries. Information on product recycling offerings can be found on IBM's Internet site at http://www.ibm.com/ibm/environment/products/prp.shtml.

Battery return program

This product may contain a sealed lead acid, nickel cadmium, nickel metal hydride, lithium, or lithium ion battery. Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. For information on disposal of batteries outside the United States, go to http://www.ibm.com/ibm/environment/products/batteryrecycle.shtml or contact your local waste disposal facility.

In the United States, IBM has established a collection process for reuse, recycling, or proper disposal of used IBM sealed lead acid, nickel cadmium, nickel metal hydride, and battery packs from IBM equipment. For information on proper disposal of these batteries, contact IBM at 1-800-426-4333. Have the IBM part number listed on the battery available prior to your call.

In the Netherlands, the following applies.

Electronic emission notices

Federal Communications Commission (FCC) statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Class A emission compliance statement

This Class A digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Australia and New Zealand Class A statement

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

United Kingdom telecommunications safety requirement

Notice to Customers

This apparatus is approved under approval number NS/G/1234/J/100003 for indirect connection to public telecommunication systems in the United Kingdom.

European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a nonrecommended modification of the product, including the fitting of non-IBM option cards.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22/European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Taiwanese Class A warning statement

警告使用者：
這是甲類的資訊產品，在
居住的環境中使用時，可
能會造成射頻干擾，在這
種情況下，使用者會被要
求採取某些適當的對策。

Chinese Class A warning statement

声　　明
此为 A 级产品。在生活环境中，
该产品可能会造成无线电干扰。
在这种情况下，可能需要用户对其
干扰采取切实可行的措施。

Japanese Voluntary Control Council for Interference (VCCI) statement

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に
基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を
引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求
されることがあります。

Power cords

For your safety, IBM provides a power cord with a grounded attachment plug to use with this IBM product. To avoid electrical shock, always use the power cord and plug with a properly grounded outlet.

IBM power cords used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA).

For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15 amperes, 125 volts.

For units intended to be operated at 230 volts (U.S. use): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a tandem blade, grounding-type attachment plug rated 15 amperes, 250 volts.

For units intended to be operated at 230 volts (outside the U.S.): Use a cord set with a grounding-type attachment plug. The cord set should have the appropriate safety approvals for the country in which the equipment will be installed.

IBM power cords for a specific country or region are usually available only in that country or region.

IBM power cord part number	Used in these countries and regions
02K0546	China
13F9940	Australia, Fiji, Kiribati, Nauru, New Zealand, Papua New Guinea
13F9979	Afghanistan, Albania, Algeria, Andorra, Angola, Armenia, Austria, Azerbaijan, Belarus, Belgium, Benin, Bosnia and Herzegovina, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo (Democratic Republic of), Congo (Republic of), Cote D'Ivoire (Ivory Coast), Croatia (Republic of), Czech Republic, Dahomey, Djibouti, Egypt, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Finland, France, French Guyana, French Polynesia, Germany, Greece, Guadeloupe, Guinea, Guinea Bissau, Hungary, Iceland, Indonesia, Iran, Kazakhstan, Kyrgyzstan, Laos (People's Democratic Republic of), Latvia, Lebanon, Lithuania, Luxembourg, Macedonia (former Yugoslav Republic of), Madagascar, Mali, Martinique, Mauritania, Mauritius, Mayotte, Moldova (Republic of), Monaco, Mongolia, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Reunion, Romania, Russian Federation, Rwanda, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Slovakia, Slovenia (Republic of), Somalia, Spain, Suriname, Sweden, Syrian Arab Republic, Tajikistan, Tahiti, Togo, Tunisia, Turkey, Turkmenistan, Ukraine, Upper Volta, Uzbekistan, Vanuatu, Vietnam, Wallis and Futuna, Yugoslavia (Federal Republic of), Zaire
13F9997	Denmark
14F0015	Bangladesh, Lesotho, Macao, Maldives, Namibia, Nepal, Pakistan, Samoa, South Africa, Sri Lanka, Swaziland, Uganda

IBM power cord part number	Used in these countries and regions
14F0033	Abu Dhabi, Bahrain, Botswana, Brunei Darussalam, Channel Islands, China (Hong Kong S.A.R.), Cyprus, Dominica, Gambia, Ghana, Grenada, Iraq, Ireland, Jordan, Kenya, Kuwait, Liberia, Malawi, Malaysia, Malta, Myanmar (Burma), Nigeria, Oman, Polynesia, Qatar, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Seychelles, Sierra Leone, Singapore, Sudan, Tanzania (United Republic of), Trinidad and Tobago, United Arab Emirates (Dubai), United Kingdom, Yemen, Zambia, Zimbabwe
14F0051	Liechtenstein, Switzerland
14F0069	Chile, Italy, Libyan Arab Jamahiriya
14F0087	Israel
1838574	Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Brazil, Caicos Islands, Canada, Cayman Islands, Costa Rica, Colombia, Cuba, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Japan, Mexico, Micronesia (Federal States of), Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Taiwan, United States of America, Venezuela
24P6873	Korea (Democratic People's Republic of), Korea (Republic of)
34G0223	Japan
36L8880	Argentina, Paraguay, Uruguay
14F0015	India
49P2110	Brazil
6952300	Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Caicos Islands, Canada, Cayman Islands, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Mexico, Micronesia (Federal States of), Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Thailand, Taiwan, United States of America, Venezuela

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